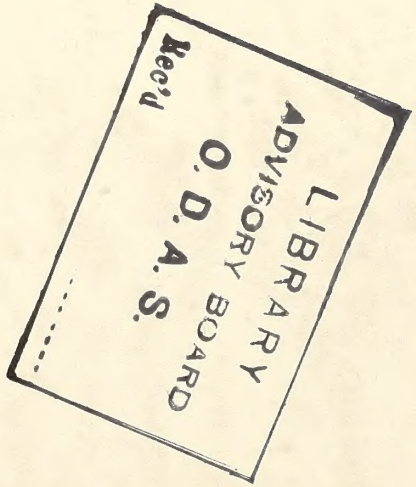
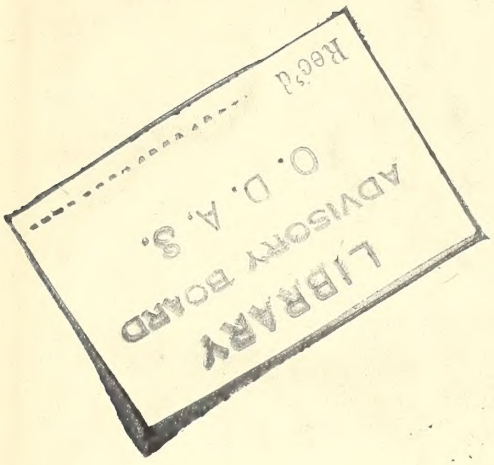
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HISTORY OF
UNITED STATES ARMY
SCHOOL OF MILITARY AERONAUTICS
Berkeley, California.

Prepared under Memorandum No. 348, dated November 13, 1918, from the Office of the Director of Military Aeronautics, Training Section, Ground Schools Branch.

By

First Lieutenant Gilbert M. Thomas.

Under the supervision of the following committee:

Major Charles B. Crane, Air Service, Aeronautics Commandant.
Dr. Baldwin M. Woods, President Academic Board.
First Lieutenant Gilbert M. Thomas, Air Service, Aeronautics.
Second Lieutenant Howard L. McLean, Air Service, Aeronautics.

Period of operation of School
From Monday, May 21, 1917, to Saturday, February 1, 1919.

Date of Completion of this History, March 1, 1919.

Vol. 2
Appendix

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SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY

CIRCULAR OF INFORMATION

For the exclusive use of officers and students of the School of Military Aeronautics

DECEMBER, 1917

(First Revision)

UNITED STATES ARMY
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY

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ADMINISTRATIVE OFFICERS

Commandant
GEO. B. HUNTER,
Major, Signal Corps, U. S. Army.

Adjutant
FRANCIS N. IGLEHART,
Captain, Signal Corps, U. S. Army.

Supply Officer
MILTON N. WILLIAMS.
1st Lieut., Sig. R. C., A. S.

Post Surgeon
BRUNO F. SANDOW,
1st Lieut., Med. R. C.

Post Dental Surgeon
G. F. STOODLEY,
1st Lieut., Dental R. C.

President of the University
Dr. BENJ. IDE WHEELER.

President of the Academic Board
Dr. BALDWIN M. WOODS.

STANDING COMMITTEES

Board of Examiners
Major GEORGE B. HUNTER
Capt. F. N. IGLEHART
Lieut. L. T. JONES
Lieut. R. B. MCPHERSON
Lieut. R. J. HEFFNER
Prof. B. F. RABER
Mr. E. N. D'OYLY

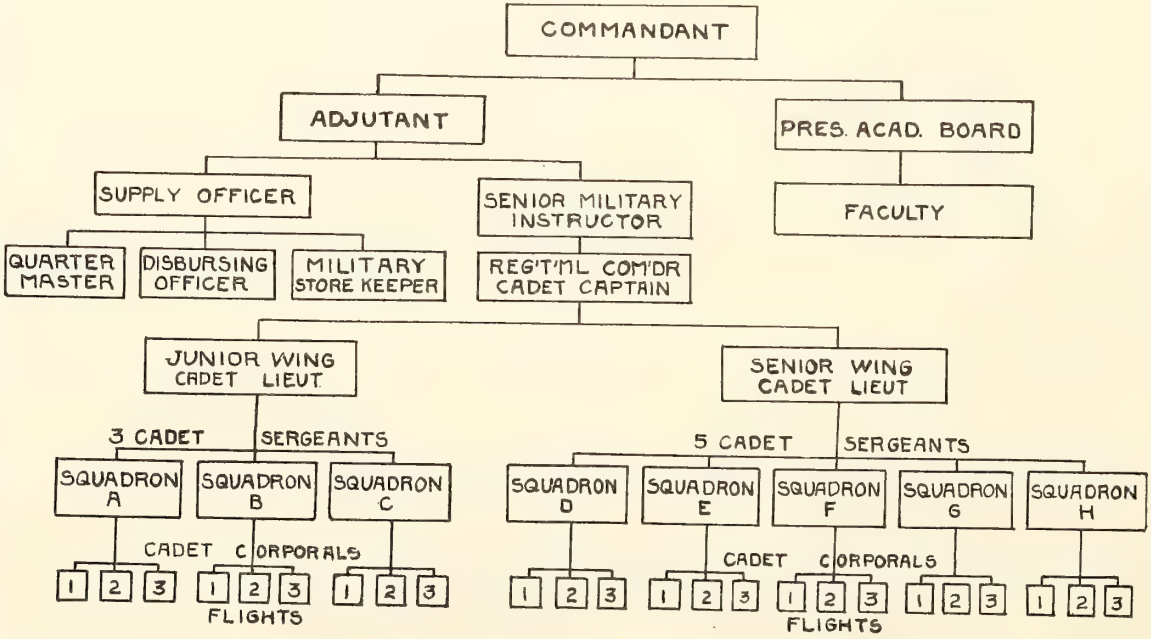
Budget Committee
Mr. H. L. MCLEAN, Chairman
Mr. J. A. POLHEMUS, JR.

Equipment and Buildings Committee
Lieut. L. T. JONES, Chairman
Prof. B. F. RABER

Publications Committee
Mr. H. A. WHITE, Chairman
Lieut. R. B. MCPHERSON
Mr. A. G. SMITH

Schedule and Curriculum Committee
Mr. J. A. POLHEMUS, JR., Chairman
Mr. D. J. CONANT

ORGANIZATION
OF
U. S. SCHOOL OF MILITARY AERONAUTICS



DIRECTORY OF OFFICERS, INSTRUCTORS AND ASSISTANTS

ANNIS, RUTH L., Clerk, Office of the Pres. of the Academic Board
201A Cal. Bkly 7100 Loc. 160
1147 Shattuck Ave. Bkly 626

BACHMAN, FRANCIS H., Intructor, Dept. of Engines
Aero Lab. Bkly 7100 Loc. 159
5207 Desmond St., Oakland Pied. 6600J

BALDWIN, JOHN L., Pvt. 1st Class, Asst. to Q. M. Sergeant
2214 Dana St. (Barracks) Bkly 1531

BALL, JAMES F., Instructor, Dept. of Airplanes
Aero Lab. Bkly 7100 Loc. 159
2545 Dwight Way Bkly 4999W

BARNHILL, WILLIAM J., Instructor, Dept. of Engines
Aero Lab. Bkly 7100 Loc. 159
2527 LeConte Ave. Bkly 3498

BELL, FRED, Q. M. Sergt., Retired; Clerk to Supply Officer
106 Cal. Hall Bkly 7100 Local 50 (2 bells)

BOELSTERLI, CHARLES, Military Storekeeper
Aero Lab. Bkly 7100 Local 159
2018 Channing Way

BURNS, JOHN, Instructor, Dept. of Gunnery
Aero Lab. Bkly 7100 Local 159
2600 Etna St. Bkly 78

CAMPBELL, MARSTON, JR., Instructor, Dept. of Mil. Studies
106 Cal. Hall Bkly 7100 Loc. 50 (2 bells)
2647 Durant Ave. Bkly 102

CLARK, L. B., Instructor, Dept. of Aerial Observation
Aero Lab. Bkly 7100 Local 159
2318 Hilgard St. Bkly 3343W

CONANT, DAVID J., Head of Dept. of Engines
Aero Lab. Bkly 7100 Loc. 159
1730 La Loma Ave. Bkly 8716

CONLIN, FRANCIS J., Instructor, Dept. of Radio and Signaling
Aero Lab. Bkly 7100 Local 159
1708 San Pablo Ave., Oakland Lakeside 4815

COON, RALPH H., Instructor, Dept. of Gunnery
Aero Lab. Bkly 7100 Loc. 159
2123 Kittredge St. Bkly 8765

COOPER, HERBERT, Watchman
Aero Lab. Bkly 7100 Local 159
2520 Virginia St. Bkly 2608

COZENS, F. W., Instructor, Dept. of Mil. Studies
22 Harmon Gym. Bkly 7100 Loc. 16
2523 Virginia St. Bkly 3531J

CROW, HAROLD I., Instructor, Dept. of Engines
Aero Lab. Bkly 7100 Loc. 159
2632 Etna St. Bkly 6474

D'OYLY, EDWARD N., Head of Dept. of Aerial Observation, Member Board of Examiners
Aero Lab. Bkly 7100 Loc. 159
1531B Arch St. Bkly 1524

ERICKSON, CARL J., Instructor, Dept. of Airplanes
Aero Lab. Bkly 7100 Local 159
2605 Durant Ave. Bkly 552

EVANS, ERROL S., Instructor, Dept. of Engines
Aero Lab. Bkly 7100 Local 159
2333 Channing Way Bkly 8321

FIELDER, HAROLD E., Instructor, Dept. of Radio and Signalling
Aero Lab. Bkly 7100 Loc. 159
2617 Durant Ave. Bkly 373

FONSECA, ARTHUR W., Instructor, Dept. of Radio and Signalling
Aero Lab. Bkly 7100 Loc. 159
2610 Valdez Ave., Oakland. Oakd 4453

FOSDICK, BEATRICE, Clerk, Office of the President of the Academic Board
201A Cal. Hall Bkly 7100 Loc. 160
2216 Dwight Way Bkly 3745

FRAZIER, DELMAR J., Pvt. 1st Class, Assistant in Dept. of Airplanes
Aero Lab. Bkly 7100 Local 159
2607 Woolsey St. Bkly 3751W

FREEBERG, HARRY E., Sergt. Medical Corps, Clerk to Post Surgeon
106 Cal. Hall Bkly 7100 Local 50 (2 bells)
2214 Dana St. (Barracks) Bkly 1531

HALLEY, JAMES L., Pvt. 1st Class, Asst. to Dental Surgeon
2214 Dana St. (Barracks) Bkly 1531

HEFFNER, ROY J., 1st Lt. Sig. R. C., A.S., Head of Dept. of Military Studies, Member Board of Examiners
106 Cal. Hall Bkly 7100
Local 50 (2 bells)
1508 Arch St., Bkly 3695J

HOLSINGER, PAUL H., Clerk
Aero Lab. Bkly 7100 Loc. 159
2332 College Ave. Bkly 1134

HORN, HENRY W., 1st Lieut., Med. R. C., Member of the Examining Board
Head Building, Post and Grant Ave., San Francisco Frkln 5889

HUNTER, GEO. B., Major, Signal Corps, U. S. Army, Commandant
108 Cal. Hall Bkly 7100 Loc. 61
1536 Le Roy Ave. Bkly 2764W

IGLEHART, FRANCIS N., Captain, Signal Corps, U. S. Army, Adjutant
108 Cal. Bkly 7100 Loc. 61
23 Panoramic Way Bkly 1061W
Faculty Club Bkly 7100 Loc. 28
or Bkly 2855

IRVINE, J., Instructor, Dept. of Engines
Aero Lab. Bkly 7100 Local 159
Oakland Y. M. C. A. Lakeside 1700

JEFFERS, HAMILTON M., Instructor, Dept. of Aids to Flight
11 Observatory
Faculty Club Bkly 7100 Loc. 28
or Bkly 2855

JOHNSON, R. L., Instructor, Dept. of Gunnery
Aero Lab. Bkly 7100 Local 159
1901 Milvia St.

JONES, LLOYD T., 1st Lieut., Sig. R. C., A. S., Head of Dept. of Gunnery, Member Board of Examiners
Aero Lab. Bkly 7100 Loc. 159
2541 Dwight Way Bkly 6628W

KEINATH, JOSEPH, Private, Bugler
2214 Dana St. (Barracks) Bkly 1531

KUNSMAN, C. H., Instructor, Dept. of Gunnery
Aero Lab. Bkly 7100 Loc. 159
2634 Bancroft Way Bkly 6744

LAMONT, HUGH W., Clerk, Office of the Commandant
106A Cal. Hall
Bkly 7100 Loc. 50 (2 bells)
2310A Prince St.

LANDERS, GEORGE F., Sergeant, Signal Corps, Barracks Clerk
2214 Dana St. Bkly 1531

MAJORS, OLIN C., Watchman
Aero Lab. Bkly 7100 Loc. 159
2345 College Ave. Bkly 62

MCDONALD, GEORGE R., Instructor, Dept. of Gunnery
Aero Lab. Bkly 7100 Loc. 159
2433 Oregon St. Bkly 6628W

MCEACHERN, NEIL W., Instructor, Dept. of Radio and Signalling
Aero Lab. Bkly 7100 Local 159
2305 Bancroft Way Bkly 7461

MCLEAN, HOWARD L., Head of Dept. of Airplanes, Instructor, Dept. of Aids to Flight
Aero Lab. Bkly 7100 Loc. 159
2605 Durant Ave. Bkly 552

MCPHERSON, ROBERT B., 1st Lieut., Sig. R. C., A. S., Head of Dept. of Radio and Signalling, Member Board of Examiners
Aero Lab. Bkly 7100 Loc. 159
Faculty Club Bkly 7100 Loc. 28
or Bkly 2855

MITCHELL, G. G., Instructor in Drill, Dept. of Military Studies
106 Cal. Hall Bkly 7100
Local 50 (2 bells)
1643 Euclid Ave. Bkly 9306

O'SULLIVAN, CURTIS D., Captain, Infantry, U. S. R., Lecturer in Mil. Studies
Armory Bkly 7100 Loc. 135
2717 Hearst Ave. Bkly 5770

PERKINS, ERWIN F., Corporal, Signal Corps, Instructor in Dept. of Radio and Signalling
Aero Lab. Bkly 7100 Loc. 159
2617 Durant Ave. Bkly 373

PILLSBURY, EDWIN S., 1st Lieut., Sig. R. C., A. S., Instructor, Dept. of Mil. Studies, Instructor Dept. of Aids to Flight
106 Cal. Hall Bkly 7100
Local 50 (2 bells)
1547 Spruce St. Bkly 2332

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201A Cal. Hall Bkly 7100 Loc. 160
126 Kempton Ave., Oakland
Oakd 9518

PRICE, THOMPSON, Instructor, Dept. of Engines
Aero Lab. Bkly 7100 Local 159
1730 La Loma Ave. Bkly 8716

RAMSEY, J. A., Instructor, Dept. of Military Studies
106 Cal. Hall Bkly 7100
Local 50 (2 bells)
2126 Kittredge St. Bkly 8765

RABER, COLLIER, Tool-room Keeper
Aero Lab. Bkly 7100 Loc. 159
Hotel Crail Bkly 6684

RABER, Prof. BENEDICT F., Advisor to the School of Military Aeronautics, Member Board of Examiners
28 Mechanics Bkly 7100 Loc. 77
2027 Delaware St. Bkly 3712

REED, HAROLD B., 1st Lieut., Sig. R. C. A. S., In Charge Practical Instruction, Dept. of Mil. Studies, Instructor, Dept. of Aerial Observation
106 Cal. Hall Bkly 7100 Loc. 50 (2 bells)
2625 Hearst Av. Bkly 7614

SANDOW, BRUNO F., 1st Lieut., Med. R. C., Post Surgeon, Lecturer, Dept. of Mil. Studies
106 Cal. Bkly 7100 Loc. 50 (2 bells)
297 Lee St., Oakland Oakd 877

SMITH, ALLYN G., Instructor, Dept. of Mil. Studies
411 Library
1508 Arch St. Bkly 3695J

SPROTT, ALBERT B., Watchman
Aero Lab. Bkly 7100 Loc. 159
2345 College Ave. Bkly 62

STEEN, EDWYN F., Instructor in Drill, Dept. of Mil. Studies
106 Cal. Hall
Bkly 7100 Loc. 50 (2 bells)
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STOODLEY, G. F., 1st Lieut., Dental R. C., Post Dental Surgeon
106 Cal. Hall
Bkly 7100 Loc. 50 (2 bells)
2502 Bancroft Way Bkly 2198
Bkly 1848

SULIK, LEO W., Instructor, Dept. of Engines
Aero Lab. Bkly 7100 Loc. 159
2125 26th Ave., Oakland

THOMAS, C. C. H., Instructor, Dept. of Gunnery
Aero Lab. Bkly 7100 Loc. 159
5964 Claremont Ave., Oakland Pied 4266J

THOMAS, EDITH, Clerk, Office of the Commandant
106 Cal. Hall
Bkly 7100 Loc. 50 (2 bells)
Alamo Hotel, Oakland Lksd 1416

THOMAS, GILBERT M., Head of Dept. of Aids to Flight
201A Cal. Hall Bkly 7100 Loc. 160
Marguerite Apts. Bkly 9039W

THOMAS, H. C., Instructor, Dept. of Gunnery
Aero Lab. Bkly 7100 Loc. 159
2539 Durant Ave. Bkly 8808

WAITE, R. A., Instructor, Dept. of Aerial Observation
Aero Lab. Bkly 7100 Loc. 159
2527 LeConte Ave. Bkly 3498

WALKER, HERMAN H., M. S. E., S. C., Retired, Chief Clerk, Office of the Commandant
108 Cal. Hall Bkly 7100 Loc. 61
2131 Blake St.

WHITE, HAROLD A., Instructor, Dept. of Engines
Aero Lab. Bkly 7100 Loc. 159
2605 Durant Ave. Bkly 552

WHITE, LEONARD M., Instructor in Drill, Dept. of Mil. Studies
106 Cal. Hall
Bkly 7100 Loc. 50 (2 bells)
1726 Euclid Av. Bkly 6706

WHITTLESEY, HAROLD C., Helper in Laboratory, Dept. of Airplanes
Aero Lab. Bkly 7100 Loc. 159
1550 La Loma Ave. Bkly 7512

WILLIAMS, MILTON N., 1st Lieut., Sig. R. C., A. S., Supply Officer, Disbursing Officer
106 Cal. Hall
Bkly 7100 Loc. 50 (2 bells)
2532 Regent St. Bkly 7528W

WITTSCHEN, EMMA, Clerk, Office of the Commandant
108 Cal. Hall Bkly 7100 Loc. 61
3121 West St., Oakland Pied 3148W

WOODS, Dr. BALDWIN M., President of the Academic Board
201A Cal. Hall Bkly 7100 Loc. 160
3038 Hillegass Ave. Bkly 1677J

GENERAL STATEMENT

HISTORY

In response to a request from the War Department in the month of May, 1917, the University of California, together with Cornell University, Massachusetts Institute of Technology, University of Texas, University of Illinois, and Ohio State University, sent three representatives of its faculty to Toronto, Canada, for the purpose of making a first-hand study of the British system of "ground schools" for the preliminary technical training of flying officers. The representatives from this University were Dr. B. M. Woods, Dr. L. T. Jones, and Prof. B. F. Raber.

As a result of this investigation and conference the War Department shortly thereafter established in the United States six Schools of Military Aeronautics, one at each of the above-mentioned universities. Since the original installation of these schools two others have been added, at the Georgia Institute of Technology and at Princeton University, respectively, making eight in all.

The plan adopted by the War Department is somewhat of an amplification of the British plan of training, in that it requires eight weeks of preliminary technical training at a School of Military Aeronautics, whereas the British system requires only seven. Upon completion of the preliminary "ground school" work, about six weeks are required in a Flying School, where the student is "in the air" for a total of thirty hours. Upon the completion of this work, in turn, four or more weeks are spent in a Finishing School, where the student is made familiar not only with the process of flying, but also with the attendant military duties of officers in flying service, such as observation, reconnaissance, etc., by means of actual practice in the work.

ADMINISTRATION

The United States Army School of Military Aeronautics at the University of California, Berkeley, is operated directly under the control of the Chief Signal Officer of the Army, at Washington. The local administration of the school is handled by the Commandant, Major Geo. B. Hunter, Signal Corps, U. S. Army, assigned to that duty by the Chief Signal Officer.

Instruction, facilities, and certain equipment are furnished by the University, under contract to the U. S. Government, for which the latter pays a weekly tuition for each student enrolled in the school. The University's representative in the school, who serves as President of the Academic Board, is Dr. B. M. Woods. The President of the Academic Board is thus responsible both to the Commandant and to Dr. Benj. Ide Wheeler, President of the University, and its Regents.

ORGANIZATION

For purposes of administration, instruction, and discipline, candidates at the School of Military Aeronautics are organized as a Regiment of two Wings, the Junior Wing and the Senior Wing, respectively. The Junior Wing is divided into three Squadrons; the Senior Wing into five. Each Squadron may again be divided into Sections, for instruction purposes; for all other purposes it is divided into Flights. The Squadron is under the leadership of a Squadron Commander; the Flight under a Flight Commander; the Section under a Squadron or a Flight Commander. Squadrons are designated alphabetically, beginning the first week as Squadron "A," and graduating at the end of the eighth week as Squadron "H."

(Refer to Organization Chart on page 6 of this Circular.)

STATUS OF STUDENTS

Prior to admission to the United States Army School of Military Aeronautics students will be enlisted as first-class privates in the Aviation Section, Signal Enlisted Reserve Corps, and rated as Flying Cadets and as candidates for commissions in a United States Training Camp, at a salary of $100 per month with an allowance of 60 cents per day for rations. Quarters are furnished.

Upon graduating from the School of Military Aeronautics and upon passing the Reserve Military Aviator tests given during training at the Flying Schools, candidates will be commissioned as Second Lieutenants, Aviation Section, Signal Corps, National Army. Training is then continued and upon passing the Junior Military Aviator tests given at a later date, an advance in rank of one grade will be made, according to law, making candidates First Lieutenants, Aviation Section, Signal Corps, National Army.

The base pay of a Second Lieutenant is $1,700 per year, with quarters or commutation of same. A Reserve Military Aviator receives 25 per cent increase on base pay when on continuous flying duty.

The base pay of a First Lieutenant is $2,000 per year, with quarters or commutation of same. A Junior Military Aviator receives 50 per cent increase on base pay when on continuous flying duty.

All grades receive 10 per cent increase on base pay when on foreign service.

ADMISSION REQUIREMENTS

Male citizens of the United States between the ages of 19 and 30 who have had sufficient education and experience (preferably high school graduates with some college or business training) may apply for admission to the Signal Officers' Reserve Corps, Aviation Section, at room 711, New Santa Fe Building, San Francisco.

Enlisted men now in any of the branches of the service may apply to the above office for admission to the Signal Officers' Reserve Corps, Aviation Section, when such application is properly made through their commanding officer and bears his approval. Requests of this sort should give company, regiment, brigade, division, and camp, in order that the men may be found without delay. These men will be notified when and where to appear for examination.

Men of draft age who have not yet been summoned by their local boards may apply for admission to the Signal Officers' Reserve Corps, Aviation Section, at the above office, when such application is accompanied by a statement from the local board to the effect that the man in question has not as yet been called.

Men of draft age who have received summons from their local board may present application as above and may, if found desirable, be examined before departing for a cantonment. Immediately upon arrival at the cantonment they should then communicate with the Aero Personnel Division, Office of the Chief Signal Officer, Washington, giving their company, regiment, brigade, division, and camp, and stating that they have successfully passed the examinations, in order that proper steps may be taken for their transfer to the Aviation Section of the Signal Corps. Such information must, of course, be forwarded through their commanding officer, but a copy should be sent directly to the Office of the Chief Signal Officer, as above, to avoid delay.

Further detailed information concerning admission requirements may be obtained at the office of the Commandant, by application to the Adjutant.

GRADUATION REQUIREMENTS

In order to graduate from the United States Army School of Military Aeronautics the student must fulfill this these conditions:

(*a*) He must maintain a satisfactory scholarship average throughout the course.

(*b*) He must satisfactorily pass all examinations given, either midcourse or final.

(*c*) He must return all equipment loaned to him in good condition, or pay any damages thereto.

(*d*) He must be photographed as prescribed under General Regulations.

(*e*) He must at all times conduct himself as becomes an officer and a gentleman.

(*f*) He must show that he possesses the qualifications of a flying officer.

(*g*) He must meet any other requirements which may from time to time be imposed.

INSTRUCTION

CURRICULUM

Instruction in the U. S. Army School of Military Aeronautics is divided into seven departments, viz.: Military Studies, Signaling and Radio, Gunnery, Aids to Flight, Airplanes, Engines, and Aerial Observation.

One or more final examinations will be given in the work of each of these departments, and all of the examinations must be passed before graduating from the school. Failure in an examination may, at the discretion of the Commandant, acting upon recommendation of the Board of Examiners, result in re-examination, set-back of one or two weeks, or in relief from instruction.

Weekly tests are given in the various departments, the results of which determine for each student suitable grades in conduct and ability to be forwarded to Washington as representing the progress which he is making. Grades secured in final examinations, weekly tests, and as a result of conduct while in the school, are of vast importance to the student, as they form part of a permanent record of his performance, to be kept on file in the Office of the Chief Signal Officer, in Washington, for future reference.

The work of the several departments is itemized in the Syllabus of the Course of Study, which follows:

SYLLABUS OF THE COURSE OF STUDY

The principal subjects taken up in lecture or in laboratory work in the various departments of the School of Military Aeronautics are itemized below:

1. Military Studies Department.

Infantry drill, including physical education and first aid.
Military courtesy, esprit de corps, discipline, and morale.
Organization and administration of the United States and of modern European armies.
Methods of modern warfare.
Army regulations, paper work, and the use of forms.
Military law and the articles of war.
Military hygiene and sanitation.

2. Signaling and Radio Department.

Signaling with buzzer, lamp, and miniature ground shutter.
Elementary principles of radio and care of apparatus.

3. Gunnery Department.

Machine gun theory and operation.
Practice on 25-yard range.
Bombs and bombing.
Fighting in the air.
Trap shooting.

4. Aids to Flight Department.

Theory of flight.
Cross-country flying.
Map reading.
Meteorology.
Night flying.
Instruments and compasses.

5. Airplanes Department.

Types of machines.
Nomenclature of airplanes.
Rigging.
Care of machines.
Repair of machines.

6. Engines Department.

Principles of engines.
Laboratory work, sketching, assembling, etc.
Care of engines and tools.
Types of engines.
Trouble shooting.

7. Aerial Observation Department.

Co-operation of aircraft with artillery.
Practical work on miniature range.
Reconnaisance.
Co-operation of aircraft with infantry.
Photography.

INSTRUCTION

DEPARTMENTAL ANNOUNCEMENTS

1. MILITARY STUDIES DEPARTMENT

Faculty.

R. J. Heffner, 1st Lieut., Sig. R. C., A. S., Head of the Department.
C. D. O'Sullivan, Capt., Inf., U. S. R., Lecturer in Military Subjects.
B. F. Sandow, 1st Lieut., Med. R. C., Post Surgeon, Lecturer in Military Hygiene, First-Aid, and Sanitation.
E. S. Pillsbury, 1st Lieut., Sig. R. C., A. S.
H. B. Reed, 1st Lieut., Sig. R. C., A. S.
Marston Campbell, Jr.
F. W. Cozens, A.B.
George G. Mitchell.
J. A. Ramsey.
A. G. Smith, B.S.
E. F. Steen.
L. M. White.

Instruction.

The work of the department is presented in both practical and theoretical form, as noted in brief, in the following paragraphs:

Practical: Instruction in infantry drill for the soldier, the squad, the company, the battalion; ceremonies; guard duty; physical training; and first-aid demonstrations.

Theoretical: Lectures, discussions, studies, and quizzes on military courtesy, discipline, esprit de corps and morale; organization and administration of the U. S. and modern European armies; methods of modern warfare; army regulations, orders, paper work, forms, and correspondence; military law, the articles of war; military hygiene, sanitation, and first-aid.

Students in the School of Military Aeronautics are under the jurisdiction of the Department of Military Studies at all times and at all places during the entire course, and are required to observe and obey, as a part of their military education and training, all orders, rules, and regulations prescribed for their conduct. The system of discipline will follow

that of West Point insofar as possible. Students should never lose sight of the fact that they are training for officers of the United States Army, and as such must be equal to the duties and responsibilities which fall upon them. The foundation for their success as officers must be composed of the training, education, and experience acquired throughout the work in military studies given during the eight weeks course.

2. SIGNALLING AND RADIO DEPARTMENT

Faculty.

R. B. McPherson, 1st Lieut., Sig. R. C., A. S., Head of the Department.
Francis J. Conlin.
Harold E. Fielder.
Albert W. Fonseca.
Neil W. McEachern.
Erwin F. Perkins.

Instruction.

During the time spent in the Department of Signaling (the entire eight weeks of the course) the student is trained to send and receive messages in the International Morse Code at a standard rate of eight words per minute. Practice is furnished by means of buzzer sets fitted with telegraph keys, and supplied from power circuits or by batteries.

The work in Radio comprises a study of the different standard wireless sets in use in the Army at the present time, together with a simple discussion of the theories involved in the construction and operation of wireless telegraph outfits. The course is based upon "Radio Telegraphy," a text book issued by the Signal Corps.

3. GUNNERY DEPARTMENT

Faculty.

L. T. Jones, 1st Lieut., Sig. R. C., A. S., Head of the Department.
John Burns, B.S.
Ralph H. Coon, M.A.
R. L. Johnson.
C. H. Kunsman, M. S.
G. R. McDonald, B.S.
C. C. H. Thomas.
H. C. Thomas, B.S.

Instruction.

The machine gun is the pilot's primary defense and a perfect knowledge of its mechanism is absolutely essential. The principal parts and the function of each are discussed. Reasons for stoppage of the gun are demonstrated, together with the remedy or immediate action in each case. Methods of cleaning, oiling, and caring for the gun are taken up. The service sights are explained. Target practice is given with the machine guns on a 25-yard range.

The course of instruction in Gunnery includes bombs and bombing as well as machine guns. Each student must know the type of bomb best suited to the work at hand, and its peculiarities of construction and operation. Safety devices must be investigated, and proper methods for sighting and aiming discussed.

Quickness of judgment and movement is cultivated by quite an extensive amount of trap shooting.

4. AIDS TO FLIGHT DEPARTMENT

Faculty.

G. M. Thomas, M.S., Head of the Department.
Hamilton M. Jeffers, A.B.
Howard L. McClean, B.S.
E. S. Pillsbury, 1st Lieut., Sig. R. C., A. S.

Work of the Department.

Consists for the most part of lectures on several subjects which aim to help the student when he begins to do actual flying. Under the head of Theory of Flight is given a brief outline of the history of flying, with special emphasis on the development of airplanes in general. The fundamental principles of aerodynamics are also included and are taught in the simplest manner possible by means of graphical explanations and without the use of formulas.

Cross-country flying is discussed through the medium of lectures and instructions for this particular type of flight, and for methods of action on a forced landing, the making out of reports, etc.

The subject of map reading is well covered, conventional signs, orientation, intersection, resection, etc., being a few of the points touched upon. There is also discussion of maps used at the front. Map interpretation is particularly emphasized and it is the plan to take the students on field trips for this particular purpose.

Pressures, winds, weather predictions, "bumps," and other irregularities of the air are touched upon under the head of Meteorology. A study of weather maps is included along with the discussion of these points.

One lecture and a night observation in Astronomy are given in order to familiarize the student with a few of the conspicuous Northern constellations and planets. Landing grounds, flares, etc., are discussed as an aid to night flying.

The barograph, barometer, anemometer, compass, tachometer, and other instruments used in flying are described from the actual forms where possible, special reference being made to the calculation of compass courses.

5. AIRPLANES DEPARTMENT

Faculty.

Howard L. McLean, B.S., Head of the Department.
James F. Ball, B.S.
Carl J. Erickson.
Delmar J. Frazier.
Harold C. Whittlesey.

Instruction.

The Department of Airplanes presents its courses in both lecture and laboratory form. During the progress of the lectures are encountered such subjects as the following: a discussion of types of machines which aims to give the student an idea of some of the service machines and their characteristics and purposes; lectures on the properties of woods, metals, and fabrics in airplane manufacture; and a discussion of the care of machines, which aims to take up the necessity for their proper treatment and for the care of a hangar.

Preliminary to the work in the laboratory is studied the subject of nomenclature. By means of a pamphlet of aeronautical terms the student is made familiar with the common "trade phrases" and learns to identify each part of the machine in the laboratory by means of its proper name. Acutal work in the laboratory includes rigging, assembling and disassembling of machines, and practice in alignment. The care of cables, wires, struts, spars and all parts of the machine; lubrication; inspections and adjustments; repairs, splicing and patching; and the common tools in use, with directions for the intelligent use of the latter are discussed.

6. ENGINES DEPARTMENT

Faculty.

David J. Conant, A.B., Head of the Department.
Francis H. Bachman.
William J. Barnhill, B.S.
Harold I. Crow, B.S.
Errol S. Evans, A.B.
James Irvine, A.B.
Thompson Price.
Collier Raber.
Leo W. Sulik
Harold A. White

Instruction.

The Engines Department instructs by lectures illustrated with engine parts and boards, and trunnioned crankshafts, and by laboratory work on partly assembled airplane motors. The lectures of each week are designed to explain, both as to material and time, the theoretical basis for the laboratory work of that week. For study at the barracks there are provided also cardboard engine models, magneto plates, and rotating cylinder illustrations. One hour of each weekly laboratory period is used as a test hour, during which time test questions are asked covering the instruction of that week, both in lectures and in laboratory.

The work of the department for Squadron C consists of elementary lectures on the use of tools. During the week of Squadron D the fundamentals of gas engine mechanism and operation are explained, together with lectures on valve mechanisms, timing of valves and firing orders of cylinders. In Squadron E the subjects of carburetion and types of carburetors, rotary engine principles and operation, the care and operation of magnetos and one lecture on types of engines. The work of Squadron F, the final week of work in this department, consists of a lecture on engine troubles, engine operation and troubles to be illustrated by the running of engines on the test stands, and a two hour examination at the end of the week which covers the work of the course.

7. AERIAL OBSERVATION DEPARTMENT

Faculty.

E. N. D'Oyly, E.E., Head of the Department.
L. B. Clark.
H. B. Reed, 1st Lieut., Sig. R. C., A. S.
R. A. Waite, B.S.

Instruction.

The work of the Department of Aerial Observation includes both lecture and laboratory periods. The subject of Artillery Observation is covered by lecture and practiced by the use of the miniature range. In this work are studied the subjects of target location and artillery direction, duty of pilots and observers, communication between airplane and ground, artillery codes, call systems and reports, pre-arranged and impromptu shoots, etc.

The miniature range, located in the Aeronautical Laboratories, represents a section of Belgium near the town of Ypres. The scale is such that distances on the range as viewed from the platform above appear to the eye the same as actual distances on the ground from an elevation of 12,000 feet. Concealed lights are placed below the surface of the range, controlled by electric switches, each light representing a bursting shell. Practice in locating targets and correcting fire is given, also practice in communicating results by wireless.

Duties of flying machines in war service are discussed in a series of lectures on the following topics: co-operation of aircraft with artillery, co-operation of aircraft with infantry, reconnaissance, and aerial photography.

EQUIPMENT

BUILDINGS AND FACILITIES

The United States Army School of Military Aeronautics has its own building, a frame structure designed particularly for this service, located in the hollow just south of the Mechanics Building (see map of the Campus). It is known as the Aeronautical Laboratories. A large addition to the building was completed in November, 1917. In this building are located offices, classrooms, two miniature ranges for aerial observation, an engine laboratory, a rigging laboratory, signalling laboratory, and a tool room.

Classes are held in the Aeronautical Laboratories, in Hilgard Hall, Gilman Hall, Agriculture Hall, Bacon Hall, and other campus buildings, the use of which has been secured through co-operation with the various departments of the University by whom the respective buildings are used.

Drill and physical exercises are held on the large field just west of California Hall, or in Harmon Gymnasium, according to prevailing weather conditions.

LITERATURE AVAILABLE

The School of Military Aeronautics is in possession of a number of copies of excellent text books, pamphlets, notes, by various authors, dealing with matters encountered in the courses studied. The student may draw any of this literature from the Tool Room, by means of a tool check, as previously explained. Students are urged to make all possible use of these books, as much excellent information is contained therein.

Administration and Military Law.
Army Regulations (U. S. A.), 1917.
Aeroplane Speaks—Barber.
Aviator and The Weather Bureau.
Annual Report—National Advisory Committee for Aeronautics.
Airplane Motor (Hallett).
Audells Automobile Guide.
Aerial Gunnery.
Carburetor Manual—Zenith.
Curtiss Hand Books.
Curtiss Specification Books.

Court Martial, Manual of the (U. S. A.), 1917.
Dykes Auto Encyclopedia.
Equipment of Aero Units (U. S. A.).
Extracts from the Army Regulations.
Fighting in the Air—Rees.
Field Service Regulations.
French Manual for Military Aviators (copy given each student).
How to Make Good Pictures.
Hall Scott Care and Operation.
Infantry Drill Regulations (U. S. A.), 1917.
Interior Guard Duty, Manual of.
Military Aeroplanes—Loening.
Map Reading.
Machine Gun Manual—Lewis.
Machine Gun Manual—Vickers.
Lewis Machine Gun Manual—Savage.
North Star Finder.
Notes on Rigging.
Officers Notes—Parker.
Plattsburg Manual.
Radiotelegraphy (U. S. Sig. Corps), 1916.
Silhouettes of Aeroplanes.
Signal Corps Training Manual—Aviation Section—Part I.
Signal Book—U. S. Army.
Small Arms Firing Manual.

New books are being added daily. Other books are available for loan and reference purposes at the University Library. (See section on the Library.)

GENERAL REGULATIONS

SOURCES OF INFORMATION

Students will be governed at all times by such rules and regulations as may emanate from any of the following sources:

1. The Circular of Information (this pamphlet).
2. Special Regulations (posted in the Barracks).
3. General Orders (when on guard duty—found in the Manual of Interior Guard Duty).
4. Special Orders (published at retreat each day—afterwards posted, except Sunday, in the Barracks).
5. Bulletin boards.

Bulletin boards are located at the Barracks, in the hallway of the Aeronautical Laboratories, and in the office of the Commandant. Upon these boards are posted all schedules of calls and of classes, all orders, regulations, and notices for students, and all matters of general interest in the school.

Students are warned that the rapidity with which changes occur, especially in the matter of schedules, demands that **each man make a practice of consulting the bulletin board at least once a day, if not twice. Remember that "ignorance of the law is no excuse."**

Students in doubt as to the course of procedure to be followed in any particular instance, or in search of further information on any subject, will secure permission from their Squadron Commanders to apply to the officer in charge at that time for proper instruction.

OFFICERS IN CHARGE

Lieutenants Pillsbury and Reed are detailed, on alternate weeks, as Officer in Charge, and as such are responsible for the conduct and efficiency of the Cadet Regiment. Permission must be secured from the Squadron Commander to speak to the Officer in Charge, and from the Officer in Charge to speak to the Commandant or the Adjutant.

DISCIPLINE

Students in the United States Army School of Military Aeronautics should bear in mind that they are enlisted in the Army of the United

States and, as such, are working to obtain commissions as officers. For this reason each man should attempt to conduct himself as a prospective officer at all times and in all places.

Strict discipline will be maintained at all times throughout the course of instruction. By discipline is meant not only the preservation of order and the performance of duty but also the habit of instantaneous and instinctive obedience. The officer who is not amenable to discipline himself can never hope to maintain it in men over whom he exercises his command.

The qualities of absolute honesty and integrity, courage in all things and true loyalty to the Army and to the United States, must all enter strongly into the character of the ideal officer.

SCHEDULES OF CALLS

The schedules of calls may be found posted on the bulletin board in the barracks. These schedules must be carefully watched for any changes which may occur from time to time and any difference noted.

RULES FOR THE ISSUING OF EQUIPMENT

All equipment and materials loaned to the students of the School of Military Aeronautics for their personal use during part or all of the course, to be returned before leaving, must be secured from the Tool Room in the Aeronautical Laboratories by the presentation of a tool check in payment therefor. This includes books and literature listed as available at the Tool Room.

Tool checks will be issued during the week of Squadron A, at the hour specified in the schedule, to students who properly sign up for them. All checks must be returned before leaving the school, at hours to be specified.

It is hardly necessary to say that careful and conscientious handling of all property while in use for study or other purposes will be demanded of all students, in order that the equipment at present available may continue to be of service to future students.

A charge will be made for all property lost or damaged. A student will not be allowed to graduate from the school until a clearance receipt has been issued to him by the Toolkeeper, certifying that all property has been returned or payment made for loss or damage.

VISITORS

None other than officers and regularly enlisted students will be permitted in the buildings or classrooms of the School of Military Aero-

nautics at any time without a written permit from the Adjutant. Such permit may be secured at Room 106 California Hall, and must be presented to either Lieut. Jones or Lieut. McPherson at the Aeronautical Laboratories before any visiting will be allowed.

PHOTOGRAPHS

Each student, before graduating, must be photographed in accordance with instructions which will be issued at the proper time.

CENSORSHIP

Students will be governed by notices posted upon the bulletin boards governing the giving out of information concerning the school.

UNIFORMS

Cadets will provide themselves with uniforms before entering upon the week of Squadron C. They will provide themelves with O. D. shirts before entering the week of Squadron B.

All cadets who have uniforms will wear them at all times when out of the Barracks. The blouse will be worn at all inspections, ceremonies, and at other times when prescribed; the O. D. shirt is satisfactory for all exercises at which the blouse is not specified. The wearing of civilian coats is prohibited. Leather or wrap puttees and service caps are not to be worn by enlisted men of this command. After having once secured a uniform, men will send all civilian clothes and all extra suitcases, etc., back home. Sweaters may be worn as an undergarment if desired, but not as an outer garment. Blouses and shirts will be buttoned throughout at all times, unless otherwise specified. No neckties will be worn. Paper, pens, pencils, etc., will not be allowed to protrude from the pockets, and no decorations will be worn except those permitted by army regulations. Clothes will be kept neat and equipment in proper condition at all times. At inspections and ceremonies shoes will be shined, clothes brushed, hair trimmed, and face shaved.

Negligence in personal cleanliness will be considered as evidence of inability to become an officer.

GENERAL INFORMATION

BERKELEY: ITS LOCATION, CLIMATE AND TRANSPORTATION FACILITIES

Location

The United States Army School of Military Aeronautics is located on the campus of the University of California, at Berkeley, a city of about 60,000 inhabitants on the eastern shore of San Francisco Bay, almost directly opposite the Golden Gate. The total student registration in the Berkeley departments of the University is about 6000.

Climate

The climate of Berkeley is comparatively uniform in temperature, extremes of heat or cold being unknown. High fog generally prevails during the mornings and evenings of the summer days, but rain during this period is exceptional. The rainy season normally starts in October or November, and continues until some time in March, with usually one or two weeks of fine weather between rainy spells.

Transportation Facilities

Transportation to and from San Francisco is furnished by the cars and ferries of two systems, the Southern Pacific and the Key Route. The Shattuck Avenue line and the Ellsworth line of the Southern Pacific run directly to the campus, the latter very close to the Aviation Barracks. Twenty-minute service is maintained throughout the day, with less frequent service at night. Connection with ferries is made at the Oakland Pier. The Berkeley (Shattuck Avenue) line and the Alcatraz Avenue line of the Key Route also run very close to the campus, the latter terminating at Telegraph and Bancroft, three blocks from the Aviation Barracks. Twenty-minute service during the day is also furnished on each of these lines, with less frequent service at night. Connection with ferries is made at the Key Route Pier. Ten cent fare is charged on all lines to San Francisco.

Transportation to and from Oakland and Alameda is furnished by the street cars of the S. F.–O. T. Ry., four lines of which run to Berkeley. These are the Grove Street line (No. 3), the Shattuck Avenue line (No. 4), the Telegraph Avenue line (No. 5), and the College Avenue

line (No. 6). All cars on the Telegraph Avenue and College Avenue lines run either directly past the Aviation Barracks or within one block of it. The time required to make the run to the center of Oakland via the Telegraph Avenue line, which is the quickest from the barracks, is a little less than thirty minutes. Frequent service is maintained on all of these lines, with a five-cent fare to both Oakland and Alameda. For the latter destination transfer must be made in Oakland.

Connections may be made in Oakland from the Berkeley lines to the Haywards line of the same company, running to Fruitvale, Elmhurst, San Leandro, and Haywards. The fare is fifteen cents from Berkeley or Oakland to Haywards.

Transportation to and from Richmond is furnished by the Oakland-Berkeley-Richmond (San Pablo Avenue) line of the S. F.–O. T. Ry., with frequent service, and fifteen-cent fare from Oakland or Berkeley to Richmond. Transfers may be obtained to this line by taking a north-bound No. 5 car in front of the Aviation Barracks.

The Berkeley depot of the Santa Fe is at the corner of University Avenue and West Street. Take No. 5 car north bound.

The Berkeley depot of the Southern Pacific (main line steam trains) is at the corner of University Avenue and Third Street. Take No. 5 car north bound.

The Berkeley depot of the Southern Pacific electric lines is at Center Street and Shattuck Avenue.

CHURCHES AND Y. M. C. A.

The members of the churches and Y. M. C. A.'s in Berkeley are greatly interested in the men of the School of Military Aeronautics. They wish to assure you that you will find friends and a hearty welcome in every church and Y. M. C. A. in Berkeley.

The Berkeley Y. M. C. A., at 2001 Allston Way, gives full membership privileges to men in uniform. Your uniform is your membership card. The University of California Y. M. C. A. occupies the first floor of Stiles Hall, at Dana and Allston. It is hoped that you will use the games, the reading-room, the piano, and the correspondence tables. Writing material is furnished freely, stamps can be bought at the office. Occasional social evenings will be arranged and good music and good speakers will be provided from time to time.

Regular Sunday services in the churches are at 11:00 A.M. and 7:30 P.M., with a few exceptions. The young people's societies, such as Christian Endeavor and Epworth League, meet at 6:30 P.M. In practically every church there is a class for university men which meets at 10:00 A.M., under special leadership. You would enjoy attendance at any

one of these classes. To all church activities you are hereby extended a cordial invitation. A list of the adjacent churches follows:

First Baptist, Dana and Haste Sts.
Rev. David Alexander Pitt, Pastor.

First Christian, Dana St. and Bancroft Way
Rev. J. H. McCartney, Pastor.

St. Mark's Episcopal. Bancroft Way and Ellsworth St.
Rev. E. L. Parsons, Pastor.

First Congregational, Dana St. and Durant Ave.
Rev. Raymond C. Brooks, Pastor.

Epworth Methodist, Telegraph and Durant Aves.
Rev. J. A. B. Fry, Pastor.

Trinity Methodist, Ellsworth St. and Allston Way
Rev. E. R. Dille, Pastor.

First Presbysterian, Dana St. and Channing Way
Rev. L. A. McAfee, Pastor.

St. John's Presbyterian, College Ave. and Derby St.
Rev. G. C. Eldridge, Pastor.

Newman Hall Chapel (Catholic), Ridge Road and La Loma Ave.

St. Joseph's (Catholic), Addison St. and McGee Ave.

HOUSING OF STUDENTS

Students in the United States Army School of Military Aeronautics at the University of California are quartered in the Aviation Barracks, known as Fluth Hall, located at 2214 Dana Street, Berkeley, just south of the campus, and in new barracks completed in November at the rear of Fluth Hall on Chapel Street. These barracks are unusually well equipped, containing a large number of toilets, showers, dressers and like conveniences.

Arrangements for the feeding of students have been made with a restaurant in an adjacent building (Stiles Hall, the University Y. M. C. A.) just north of the barracks on Dana street.

THE UNIVERSITY LIBRARY

The University Library, containing some 340,000 volumes, is open to students in the School of Military Aeronautics, who have the same privileges of drawing out books, manuscripts, and periodicals as do the regular students in the University.

Hours during which the Library is open are between 8 A.M. and 9 P.M. on week days and between 9 A.M. and 5 P.M. on Sundays. During the vacation periods the hours range from 8 A.M. to 5 P.M., Monday to Friday inclusive; Saturday from 8 A.M. to noon; closed on Sundays.

In the Reserve Room on the first floor, sections 236, 237, and 238, are placed nearly all books on Military Aeronautics and allied subjects for the convenience of the men in the school. This collection of books is up-to-date and contains many which might be of interest to the students in connection with the work taken up in the classroom.

MEDICAL AND DENTAL TREATMENT

Students attending the U. S. Army School of Military Aeronautics at the University of California are allowed full privileges of the University Infirmary, located on the southeast corner of the campus (see map attached), which is acknowledged to be one of the best of its kind in the United States. This entitles the student to consultation and treatment. Full hospital care is given in case of serious illness.

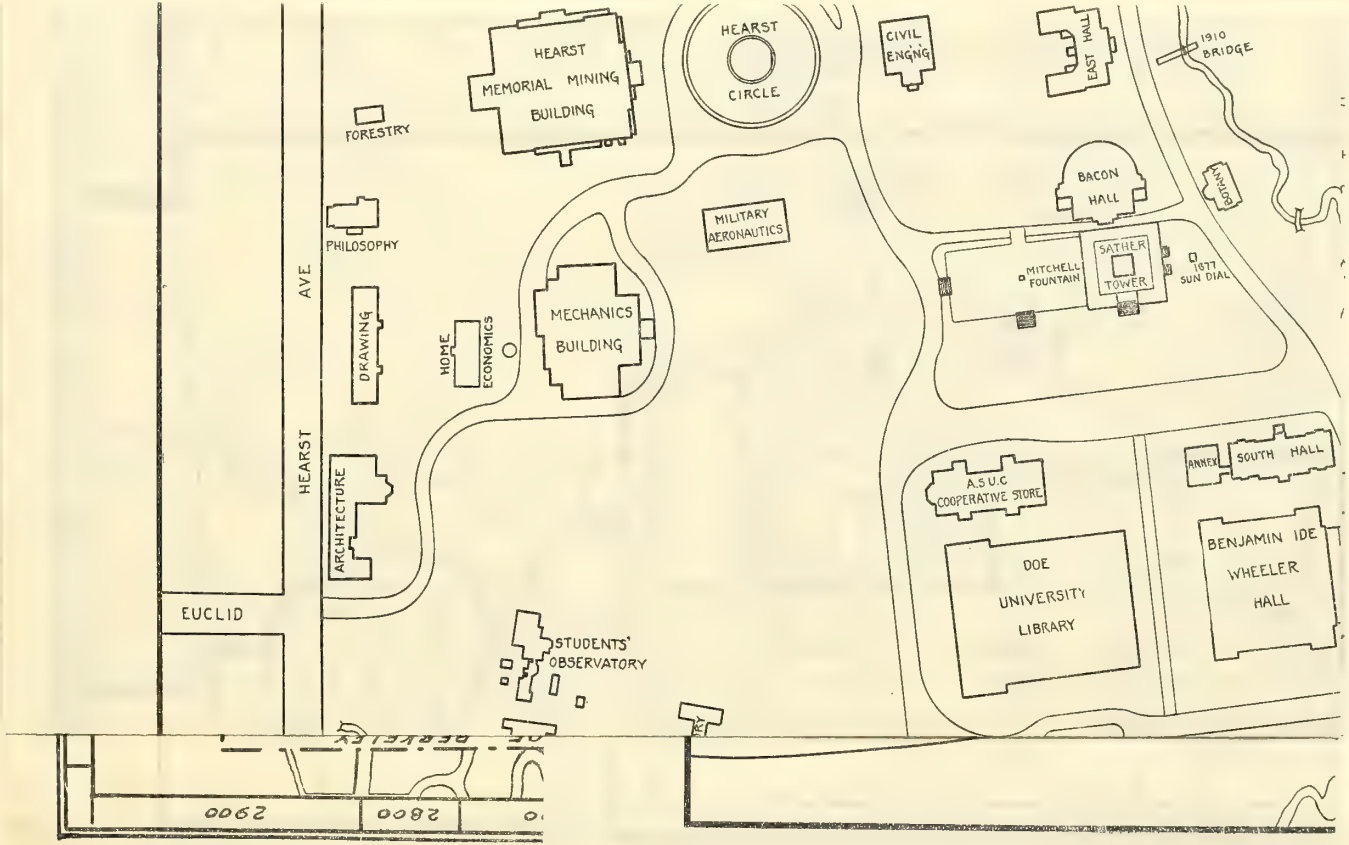
Medical service for the School of Military Aeronautics is supervised by the Post Surgeon, Dr. B. F. Sandow, 1st Lieut., Med. R. C.

Dental service is supervised by Dr. G. F. Stoodley, 1st Lieut., Dental R. C.

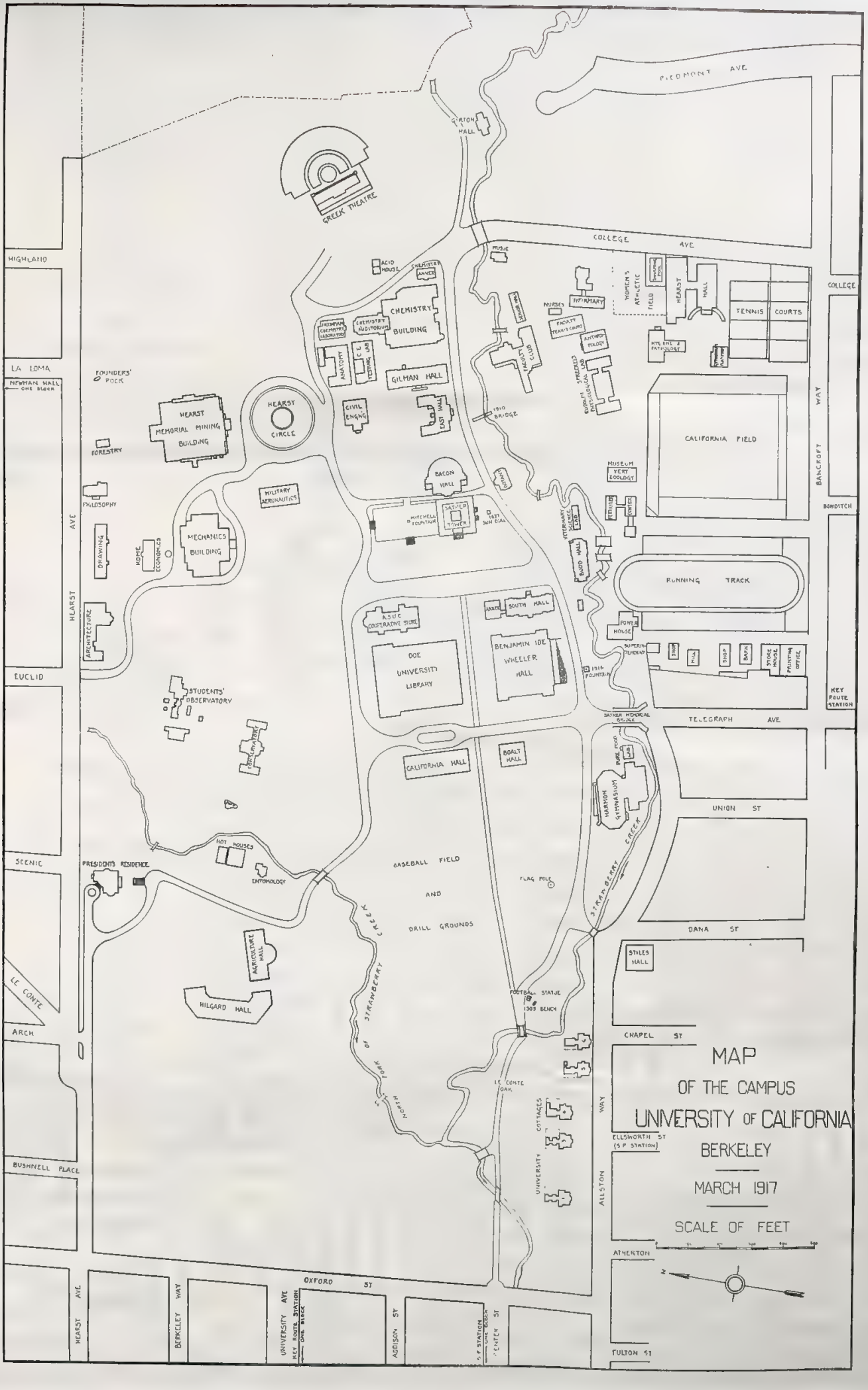
Sick call is sounded daily, except Sunday, at 12:50 P.M.

Students are urged to take advantage of these privileges, and to avoid neglect of any ailment, however trivial it may at first appear, as a measure of precaution against illness, and against the spread of disease throughout the student body.

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HEARST MEMORIAL MINING BUILDING
HEARST CIRCLE
CIVIL ENGNG
EAST HALL
1910 BRIDGE
FORESTRY
BACON HALL
BOTANY
PHILOSOPHY
MILITARY AERONAUTICS
MITCHELL FOUNTAIN
SATHER TOWER
1877 SUN DIAL
MECHANICS BUILDING
HOME ECONOMICS
DRAWING
HEARST AVE
ARCHITECTURE
A.S.U.C COOPERATIVE STORE
ANNEX
SOUTH HALL
DOE UNIVERSITY LIBRARY
BENJAMIN IDE WHEELER HALL
EUCLID
STUDENTS' OBSERVATORY
2900
2800


BERKELEY
IN THE VICINITY OF THE
UNIVERSITY OF CALIFORNIA.
SCALE OF FEET.
CITY LINE OF BERKELEY
CITY LINE OF OAKLAND AND BERKELEY
EAST BOUNDARY OF BERKELEY
UNIVERSITY AVENUE
SHATTUCK AVENUE
TELEGRAPH AVENUE
COLLEGE AVENUE
DANA AVENUE
FULTON STREET
ARLINGTON AVENUE
EUCLID AVENUE
ARCH STREET
CEDAR STREET
HEARST AVENUE
VIRGINIA STREET
ASHBY AVENUE
ALCATRAZ AVENUE
DURANT AVENUE
BANCROFT WAY
DWIGHT WAY
HILGARD AVENUE
RUSSELL STREET
DERBY STREET
PARKER STREET
BLAKE STREET
WARD STREET
STUART STREET
OREGON STREET
PRINCE STREET
WOOLSEY STREET
WEBSTER STREET
HARMON STREET
FAIRVIEW STREET
CHANNING WAY
HASTE STREET
ALLSTON WAY
KITTREDGE STREET
ADDISON STREET
CENTER STREET
LINCOLN STREET
FRANCISCO STREET
DELAWARE STREET
BERKELEY WAY
EUNICE STREET
BERRYMAN STREET
ROSE STREET
YOLO AVENUE
CHARDONNEY CREEK
HOPKINS STREET
SUMMER STREET
BAY VIEW PLACE
ROSE TERRACE
RESERVOIR
PANORAMA HILL
SHASTA ROAD
VINE STREET
CAMPANILE WAY
CANYON ROAD
PROSPECT STREET
FOREST AVENUE
GARBER STREET
CLAREMONT AVENUE
CLAREMONT HOTEL
OAK VALE AVENUE
OAK RIDGE ROAD
INSTITUTE FOR THE DEAF DUMB AND THE BLIND
LE CONTE AVENUE
SCENIC AVENUE
RIDGE ROAD
LOMA VISTA
LOMA ALTA
ARCH ST. PARK
EUCLID AVE. PARK
HILGARD AVE. PARK
VIRGINIA ST. PARK
SCHOOL
CHURCH
LIBRARY
GYM
STADIUM
MUSEUM
POWER HOUSE
CHEMISTRY
PHYSICS
ENGINEERING
MINING
AGRICULTURE
BOTANY
ZOOLOGY
GEOLOGY
ANTHROPOLOGY
PHILOSOPHY
HISTORY
ECONOMICS
POLITICAL SCIENCE
MATHEMATICS
ASTRONOMY
PHYSIOLOGY
BACTERIOLOGY
PHARMACY
DENTISTRY
MEDICINE
HOSPITAL
GYMNASIUM
CALIFORNIA HALL
LECONTE HALL
HEARST MEMORIAL MINING BUILDING
HEARST GREEK THEATRE
HEARST GYMNASIUM FOR WOMEN
STUDENTS' OBSERVATORY
FACULTY CLUB
PRESIDENT'S HOUSE
FACULTY WOMEN'S CLUB
STUDENTS' CO-OPERATIVE SOCIETY
BERKELEY CITY HALL
BERKELEY CITY JAIL
BERKELEY FIRE DEPARTMENT
BERKELEY POLICE DEPARTMENT
BERKELEY PUBLIC LIBRARY
BERKELEY HIGH SCHOOL
BERKELEY BAPTIST DIVINITY SCHOOL
BERKELEY CHRISTIAN COLLEGE
BERKELEY GYMNASIUM
BERKELEY PUBLIC SCHOOL
BERKELEY SCHOOL
BERKELEY TENNIS CLUB
BERKELEY WOMAN'S CLUB
BERKELEY YACHT CLUB
BERKELEY YMCA
BERKELEY YWCA
BERKELEY CHAMBER OF COMMERCE
BERKELEY CHAUTAUQUA
BERKELEY CHILDREN'S HOSPITAL
BERKELEY CHRISTIAN SCHOOL
BERKELEY CHRISTIAN SCHOOL FOR GIRLS
BERKELEY CHRISTIAN SCHOOL FOR BOYS


PIEDMONT AVE.
STERNS HALL
GREEK THEATRE
COLLEGE AVE.
HIGHLAND
LA LOMA
NEWMAN HALL ONE BLOCK
FOUNDERS' ROCK
HEARST MEMORIAL MINING BUILDING
HEARST CIRCLE
FORESTRY
PHILOSOPHY
DRAWING
HOME ECONOMICS
MECHANICS BUILDING
ARCHITECTURE
MILITARY AERONAUTICS
HEARST AVE
EUCLID
SCENIC
LE CONTE
ARCH
BUSHNELL PLACE
ACID HOUSE
CHEMISTRY AMPHITHEATER
CHEMISTRY BUILDING
FRESHMAN CHEMISTRY LABORATORY
CHEMISTRY AUDITORIUM
ANATOMY
P.C.L. TESTING LAB
GILMAN HALL
CIVIL ENGNG
EAST HALL
1910 BRIDGE
MUSIC
FACULTY CLUB
NURSES
INFIRMARY
FACULTY TENNIS COURT
WOMEN'S ATHLETIC FIELD
SWIMMING POOL
HEARST HALL
TENNIS COURTS
ANTHROPOLOGY
HYG. ENG. & PATHOLOGY
BOTANICAL LAB
STANLEY HALL
CALIFORNIA FIELD
BANCROFT WAY
BANDITCH
COLLEGE
MUSEUM VERT ZOOLOGY
BACON HALL
MITCHELL FOUNTAIN
SATHER TOWER
1873 SUN DIAL
VETERINARY CLINIC LAB
FITTINGS
GYMNASIUM
BARD HALL
RUNNING TRACK
POWER HOUSE
SUPERINTENDENT
STORE
MILL
SHOP
BARN
STORE HOUSE
PRINTING OFFICE
KEY ROUTE STATION
TELEGRAPH AVE.
SATHER MEMORIAL BRIDGE
A.S.U.C. COOPERATIVE STORE
SOUTH HALL
DOE UNIVERSITY LIBRARY
BENJAMIN IDE WHEELER HALL
1914 FOUNTAIN
STUDENTS' OBSERVATORY
PUMP HOUSE
BOALT HALL
CALIFORNIA HALL
HARMON GYMNASIUM
UNION ST
DANA ST
STILES HALL
CHAPEL ST
HOT HOUSES
PRESIDENTS RESIDENCE
ENTOMOLOGY
BASEBALL FIELD AND DRILL GROUNDS
FLAG POLE
STRAWBERRY CANYON
AGRICULTURE HALL
HILGARD HALL
FOOTBALL STATUE
1305 BENCH
NORTH FORK OF STRAWBERRY CREEK
LE CONTE OAK
COTTAGES
UNIVERSITY
ALLSTON WAY
ELLSWORTH ST (S.P. STATION)
ATHERTON
TULTON ST
OXFORD ST
BERKELEY WAY
UNIVERSITY AVE
KEY ROUTE STATION
OAK BRIDGE
ADDISON ST
S.P. STATION
CENTER ST
MAP
OF THE CAMPUS
UNIVERSITY OF CALIFORNIA
BERKELEY
MARCH 1917
SCALE OF FEET


GIRTON HALL
GREEK THEATRE
HIGHLAND
LA LOMA
NEWMAN HALL
ONE BLOCK
FOUNDERS' ROCK
ACID HOUSE
CHEMISTRY ANNEX
MUSIC
FRESHMAN CHEMISTRY LABORATORY
CHEMISTRY AUDITORIUM
CHEMISTRY BUILDING
ANATOMY
C E TESTING LAB
GILMAN HALL
SENIOR HALL
FACULTY CLUB
NURSE

145817

APPENDIX F1

Contains the following:

Curriculum and Schedule
first put into effect
May 21, 1917.

(8 pages)

Appendix No. F1

School of Military Aeronautics
Berkeley

Schedule First Put in Use May 21, 1917.

Dept. I. General Aeronautics. (A, D & G)

Preliminary Lecture
Types of Machines
History of Flying
Theory of Flight
Aerial Fighting
Cross-country and General flying.
Care of Machines
Rigging and Splicing
Instruments
Meteorology
Astronomy
Photography

Dept. II. Signalling. (C & F)
Maps and Miniature Range
Artillery Observation
Wireless and Signalling

Dept. III. Military
75 Preliminary Drill & Physical Ed.
2 Articles of War
3 Army Regulations
4 Troop formations
1
20 Drill
20 Calesthenics.

Dept. IV. Motive Power.

Engines

Dept. V. Gunnery.

Machine Guns
Bombs

Columbia Flight Put in Use May 21, 1917.

Appendix No.____

A.

Types of Machines
Preliminary Lecture
History of Flying
Theory of Flight
Aerial Fighting

---- Woods.

B.

Articles of War
Army Regulations
Troop Formations.

---- Krogstad.

C.

Wireless & Signalling.

----McPherson.

D.

2. Cross Country & General Flying
2. Instruments
2. Meteorology
1. Astronomy.
1. Photography.
1. Examination.

E.

Machine Guns
Bomb.

---- Jones

F.

Maps & Articles of Observations.

---- D'Oyley.

Appendix No. ____

G.

Rigging and Splicing
Care of Machines

H.

Engines

-----Raber.

Appendix No.____

1st Week.

	8:00 to 10:00	11:00	2:00	3:00	4:00	
Mon	Drill		Drill	Drill		
Tues	Drill	Prelim. Lecture	Drill	Drill		
Wed	Drill	Signalling	Drill	Drill		
Thur	Drill	Hist. of Flying	Drill	Drill		
Fri	Drill	Hist. of Flying	Drill	Drill		
Sat	Drill					

Calisthenics 6:30 - 7:00 A. M. 2d Class

Mon	Drill		Drill	Drill		
Tues	Drill	Army Regulations	Drill	Drill		
Wed	Drill	Army Regulations	Drill	Drill		
Thur	Drill	Army Regulations	Drill	Drill		
Fri	Drill	A War	Drill	Drill		
Sat	Drill	A War	Drill	Drill		

Calisthenics 6:30 to 7:00.

Appendix No. ____

3d Week

	8:00 to 10:00	11:00	2:00	3:00	4:00
Mon	Drill	Machine Guns	Drill	Drill	
Tues	Drill	Signalling	Drill	Drill	
Wed	Drill		Drill	Drill	
Thur	Drill	Machine Guns	Drill	Drill	
Fri	Drill	Machine Guns	Drill	Drill	
Sat	Drill	Aerial Fighting			

Calisthenics 6:30 to 7:00 A. M.

4th Week

	9:00 to 10:00				
Mon	Machine Guns Maps	Theory of flight	Wireless Artillery	Bombs	
Tues	Theory of flight Artillery (Maps)	Instruments	Observation	Wireless	
Wed	Observation	Instruments	Bombs	Bombs	Bombs
Thur	Machine Guns Wireless	Observation	Wireless		
Fri	Maps Tools		Rigging	Rigging	
Sat	Machine Guns	Engine Lecture			

Calisthenics 6:30 to 7:00

Drill 8:00 to 9:00 A.M.

Appendix No.___

5th Week

	9:00	10:00	11:00	2:00	3:00	4:00
Mon	Tools	Artillery Observation	Engine Lecture	Machine guns		
Tues	Engine Laboratory					
Wed	Machine guns	Maps	Wireless			Meteorology
Thur	Artillery Observation	Splicing	Wireless	Rigging	Rigging	
Fri	Maps	Wireless	Artillery Observation			
Sat	Artillery Observation	Meteorology	Wireless			

Calisthenics 6:30 to 7:00 A. M.

Drill 8 to 9 A. M.

6th Week

Mon	Care of Machine	Wireless	Maps	Artillery Observation		
Tues	Wireless	Machine	Guns	Rigging		
Wed	Astronomy	Wireless	Engine Lecture	Machine	Guns	
Thur	Splicing	Maps	Engine Lecture	C.C. & G. Flying	Wireless	
Fri	Engine Laboratory					
Sat	Wireless	Artillery Observation				

Calisthenics 6:30 to 7:00 A. M.

Drill 8:00 to 9:00 A. M.

Drill 8:00 to 9:00 A. M.

Appendix No.____

N. B. Squad is divided into two groups, #7_1 & #7_2

7_1 Week

	9:00	10:00	11:00	2:00	3:00	4:00
Mon	Wireless Artillery	Magneto Engine	Troop Formation	----Rigging----------		Splicing
Tues	Observation	Lecture	Maps	Wireless Artillery	Artillery Observation	Observation
Wed	Wireless	Engine Lecture	Troop Formation	Observation	Photography	
Thur	Rotary	Engine	Laboratory	----	Rotary Engine	Laboratory
Fri	Machine Guns		Wireless Troop	Machine Guns		
Sat			Formation			

7_2 Week

Mon	Wireless Artillery	Magneto Engine	Troop Formation	Rigging		Splicing
Tues	Observation	Lecture	Maps	Wireless Artillery	Artillery	Observation
Wed	Wireless	Lecture Engine	Troop Formation	Artillery Observation	Photography	
Thur			Troop Formation	Machine	Guns	
Fri	Machine	Guns	Wireless	Rotary	Engine Laboratory	
Sat	Rotary Engine Laboratory					

Calisthenics 6:30 to 7:00 A. M.

Drill 8:00 to 9:00 A. M.

Appendix No.____

8th Week

	9:00	10:00	11:00	2:00	3:00	4:00
Mon	Engine Lecture	Types of Machines		ENGINE	LABORATORY	
Tues	Engine Lecture	C.C. & G. Flying	Troop Formation	Machine	Guns	
Wed	EXAM Theory of	Flight	Engine	Laboratory		
Thur	Wireless	Wireless		Artillery	Observ.	
Fri	Care of Machines	EXAM Engines		EXAM Maps, Obdervation, etc.		
Sat	EXAM Ast, Met, etc.	EXAM Machine	Guns	EXAM Wireless		

Calisthenics 6:30 to 7:00 A. M.

Drill 8:00 to 9:00 A. M.

6:00 to 9:00 A. M.

3:00 to 7:00 P. M.

APPENDIX F2

Contains the following:

Curriculum of June 5, 1917.

(1 page)

Appendix No. F2

CURRICULUM FOR THE SCHOOLS OF MILITARY AERONAUTICS

Revised June 5, 1917.

Senior wing . . . . . five weeks.

Examination group	Subject	No. of hours laboratory	No. of hours lectures	Total No. of hours
1: Engines	Stationary engines. . . .	20	6	26
	Rotary engines	6	2	8
	Magneto		1	1
2: Theory of Flight	Theory of flight		2	2
	Types of machines		1	1
	Care of machines		2	2
	Sailmaking and splicing .	3		3
	Rigging and landing gear .	9		9
	Tools		2	2
	Nomenclature of airplanes .	4		4
3: Cros-Country and general flying	Meteorology		3	3
	Astronomy		1	1
	Photography		2	2
	Instruments and compasses		4	4
	Flying		3	3
	Transportation by motor		2	2
4: Aerial observation	Artillery observation		6	6
	Miniature range	12		12
	Map reading and reconnaissance		8	8
	Machine guns	18	2	20
	Bombs and bombing		2	2
6: Signaling and wireless	Radio and wireless	3	2	5
	Telegraphy and signaling .	15		15
			Total	141

Each week	27 hours)	
Each day except Saturday and Sundays.	5 ")	
Saturdays	2 ")	133
Sundays	0 ")	

10 hrs. of the 141 are to be given in 3rd week of Junior Wing as follows:

Cross-country and General flying -	3 hrs.	lect.
Theory of flight ----------	2 "	"
Machine Gun ----------	5 "	"

By authority of the Chief Signal Officer

HIRAM BINGHAM
Aeronautical Engineer in charge
of the Schools of Military Aeronautics.

Cuticle wing 11

APPENDIX F3

Contains the following:

Curriculum of June 11, 1917.

(1 page)

Appendix No. F3

Revised June 11, 1917

CURRICULUM FOR THE SCHOOLS OF MILITARY AERONAUTICS.

Examination Group	Subject	No. of hours Laboratory or Recitation	No. of hours Lectures	Total No. of hours
1. Engines	Stationary engines	20	6	26
	Rotary engines	6	2	8
	Magneto theory		1	1
2. Theory of flight	#History of flying		1	1
	#Theory of flight		2	2
	Nomenclature of Aeroplanes	4		4
	Types of machines		1	1
	Cares of machines		2	2
	Repair of machines (Sailmaking and splicing)	3		3
	Rigging and landing gear	9		9
	Tools		2	2
3. Cross-country and general flying	#Flying		3	3
	Meteorology		3	3
	Astronomy		1	1
	Photography		2	2
	Instruments and compasses		4	4
	Transportation by Motor		2	2
4. Aerial observation	Artillery observation		5	5
	Miniature range	12		12
	Map reading	4		4
	Reconnaisance		4	4
	Contact Patrol		1	1
5. Gunnery	#Machine Guns (elementary)	15		15
	Fighting in Air		1	1
	Machine Guns (advanced)	14		14
	Bombs and Bombing	2	2	2
6. Signalling and wireless	#Telegraphy (elementary)	18		18
	Radio	2	3	5
	Telegraphy and signalling	15		15
7. Military Studies	#Military Policy of the U.S.		1	1
	#Military hygiene		1	1
	#Administration and military law		3	3
	#Army regulations		2	2
	#Organization of Modern Armies		4	4
			Total	183

Subjects marked # are given in the Junior Wing 50
Senior Wing 133

Total 183

THE ARMY LIBRARY
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APPENDIX F4

Contains the following:

Curricula of November 1, 1917 -(2 pages)
Curricula of September 26, 1917 -(2 pages)
Stencil No. 37 -(5 pages)
Memorandum No. 202 -(3 pages)
Memorandum No. 230 -(2 pages)
Bulletin No. 75 -(3 pages)
Memorandum No. 247 -(4 pages)

Appendix No.____ Supplement to Stencil No. 37

WAR DEPARTMENT
Office of the Chief Signal Officer
WASHINGTON
Air Division
Schools Section.

CURRICULUM FOR THE U.S. SCHOOLS OF MILITARY AERONAUTICS
Revised September 26, 1917.

Examination Group	Subject	Total Hours	1st	2nd	3rd	4th	5th	6th	7th	8th
1. Military Studies 110 hrs.	Practical	88	21	21	21	5	5	5	5	5
	Theoretical	20	8	8	4	-	-	-	-	-
	Examination	2	-	-	2	-	-	-	-	-
2. Signalling and Radio 40 hrs.	Practical Signalling (at least ½ hr. daily)	29	5	5	4	3	3	3	3	3
	Field work	5	-	-	-	-	-	-	-	5
	Radio	3	-	-	-	-	-	-	3	-
	Examinations	3	-	-	1	-	-	-	-	2
3. Gunnery 42 hrs.	Practical (at least ½ hr. daily)	32	5	5	4	3	3	3	3	6
	Aerial tactics	3	-	-	-	-	-	-	3	-
	Bombs and bombing	4	-	-	-	-	-	-	2	2
	Examinations	3	-	-	1	-	-	-	-	2
4. Aids to Flight 25 hrs.	Theory of flight	4	-	-	-	2	2	-	-	-
	Cross country flying	3	-	-	-	-	-	-	3	-
	Map reading	8	-	-	-	2	2	2	2	-
	Meteorology	3	-	-	-	-	-	3	-	-
	Night flying	2	-	-	-	-	-	1	1	-
	Instruments & compasses	3	-	-	-	1	1	1	-	-
	Examination	2	-	-	-	-	-	-	-	2
5. Airplanes 25 hrs.	Types of machines	2	-	-	-	-	1	1	-	-
	Nomenclature	2	-	-	-	2	-	-	-	-
	Rigging	12	-	-	-	4	4	4	-	-
	Care of machines	1	-	-	-	-	1	-	-	-
	Repair of machines	6	-	-	-	2	2	2	-	-
	Examination	2	-	-	-	-	-	2	-	-
6. Engines 42 hrs.	Principles of internal combustion engines, carburetion, ignition	8	-	-	-	4	4	-	-	-
	Laboratory work	28	-	-	-	9	10	9	-	-
	Care of engines & tools	2	-	-	-	2	-	-	-	-
	Types of engines	1	-	-	-	-	1	-	-	-
	"Trouble shooting"	1	-	-	-	-	-	1	-	-
	Examination	2	-	-	-	-	-	2	-	-

| | | |

Appendix No. ____

7. Aerial Observation 24 hrs.	Cooperation with artillery	4	-	-	-	-	-	-	4	-
	Practical miniature range-	12	-	-	-	-	-	-	6	6
	Reconnaissance ----------	2	-	-	-	-	-	-	2	-
	Cooperation with infantry-	1	-	-	-	-	-	-	-	1
	Photography -------------	3	-	-	-	-	-	-	1	2
	Examination -------------	2	-	-	-	-	-	-	-	2
	TOTAL ---	308	39	39	37	39	39	39	38	38

Note:- A week of 39 hrs. means 4 hrs. A.M. and 3 hrs. P.M. except Saturday.

By direction of the Chief Signal Officer.

Hiram Bingham,

Major, A.S.,S.C.,U.S.R.,
O.I.C. Schools Section.

WAR DEPARTMENT
Office of the Chief Signal Officer
WASHINGTON
Air Division
Schools Section

CURRICULUM FOR THE U. S. SCHOOLS OF MILITARY AERONAUTICS
Revised November 1, 1917.

Examination Group		Total Hours	Hours per Week 1st	2nd	3rd	4th	5th	6th	7th	8th
1. Military Studies 115 hrs.	Practical	85	20	20	20	5	5	5	5	5
	Theoretical	20	8	8	4	-	-	-	-	-
	Saturday Inspection	8	1	1	1	1	1	1	1	1
	Examination	2	-	-	2	-	-	-	-	-
2. Signalling and Radio 35 hrs.	Practical Signalling (at least ½ hr. daily)	30	5	5	5	3	3	3	3	3
	Radio lectures-non technical	3	-	-	-	-	-	-	3	-
	Examination	2	-	-	1	-	-	-	-	1
3. Gunnery 50 hrs.	Practical (at least ½ hr. daily)	40	5	5	5	5	5	5	5	5
	Aerial tactics	3	-	-	-	-	-	-	1	2
	Bombs and bombing	4	-	-	-	-	-	-	2	2
	Examination	3	-	-	1	-	-	-	-	2
4. Aids to Flight 24 hrs.	Theory of flight	4	-	-	-	2	2	-	-	-
	Cross Country Flying	2	-	-	-	-	-	-	2	-
	Map reading	8	-	-	-	-	2	2	2	2
	Meterorology	3	-	-	-	-	-	3	-	-
	Night flying	2	-	-	-	-	-	-	1	1
	Instruments & compasses	3	-	-	-	-	-	1	1	1
	Examination	2	-	-	-	-	-	-	-	2
5. Airplanes 24 hrs.	Types of machines	1	-	-	-	-	1	-	-	-
	Nomenchature	2	-	-	-	2	-	-	-	-
	Rigging	12	-	-	-	4	4	4	-	-
	Care of machines	1	-	-	-	-	1	-	-	-
	Repair of machines	6	-	-	-	2	2	2	-	-
	Examination	2	-	-	-	-	-	2	-	-
6. Engines 39 hrs.	Principles of internal combustion engines, carburetion, ignition	8	-	-	-	4	4	-	-	-
	Laboratory work	25	-	-	-	9	8	8	-	-
	Care of engines & tools	2	-	-	-	2	-	-	-	-
	Types of engines	1	-	-	-	-	1	-	-	-
	"Trouble shooting"	1	-	-	-	-	-	1	-	-
	Examination	2	-	-	-	-	-	2	-	-

Duties of the Chief Signal Office

Air Division

Issued November 1, 1917.

CURRICULUM FOR THE U. S. SCHOOLS OF MILITARY AERONAUTICS
Revised November 1, 1917.

Examination Group	Subject	Total Hours	Hours per Week 1st	2nd	3rd	4th	5th	6th	7th	8th
7. Aerial Observation 25 hrs.	Cooperation with artillery	4	-	-	-	-	-	-	4	-
	Practical miniature range-	12	-	-	-	-	-	-	6	6
	Reconnaissance ----------	2	-	-	-	-	-	-	2	-
	Cooperation with infantry	1	-	-	-	-	-	-	-	1
	Photography ----------	4	-	-	-	-	-	-	1	3
	Examination ----------	2	-	-	-	-	-	-	-	2
	TOTAL	312	39	39	39	39	39	39	39	39

Note: A week of 39 hrs. means 4 hrs. A.M.; and 3 hrs. P.M. except Saturday.

By direction of the Chief Signal Officer,
Hiram Bingham
Lt. Col. - Signal Corps.

Appendix No. F4

Stencil No. 37

W A R D E P A R T M E N T
Office of the Chief Signal Officer
W A S H I N G T O N
Air Division
Schools Section

COURSE OF STUDY PRESCRIBED FOR UNITED STATES SCHOOLS OF MILITARY AERONAUTICS

Revised September 21, 1917.

---

1. Military Studies:

(a) Practical: Infantry drill through the school of the company, ceremonies, guard duty, physical training and first aid.

(b) Theoretical: Lectures, demonstrations and the study of texts. (1) Military courtesy, esprit de corps and morale, (2) Organization and administration of the U.S. and Modern European Armies, (3) Army regulations, orders, army paper work and use of forms, (4) Military Law, both substantive and administrative, (5) Military Hygiene.

2. Signalling and Radio:

(a) Signalling: Students are required to send and receive at least 8 words per minute. Buzzing and visual signalling. Practice on Miniature ground shutter; rate of 4 words per minute.

(b) Radio: Elementary principles of Radio discussed and students required to know the parts of a simple wireless instrument. Demonstration of the same. Practical points on use and care of airplane wireless apparatus.

3. Gunnery:

(a) Student is required to know the nomenclature of the gun thoroughly and tests in stripping, etc., are required. Sighting practice. Shooting on 25-yard ranges. Various types of machine guns discussed and studied.

(b) Fighting in the Air: A discussion of Aerial tactics.

(c) Bombs and Bombing: Fuses and detonators, various types of bombs, bomb-sights, bomb dropping, formation of a bombing raid, etc.

WAR DEPARTMENT
Office of the Chief Signal Officer
WASHINGTON

SPECIAL REGULATIONS
No. 21

SIGNAL SCHOOL OF MILITARY AERONAUTICS, 1917.

Revised September 21, 1917.

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1. [illegible]:

(a) Practical: Infantry drill through the school of the soldier, corporation, squad duty, physical training and first aid.

(b) Theoretical: Position, documentations and so on with notes. (1) Military courtesy, organization and assignment of the Army, and General Orders relating thereto. (2) Organization and assignment of the Army, orders, army paper work and use of terms, Military Law, both substantive and administrative, (a) Military Hygiene.

2. Signalling and Radio:

(a) Signalling: Students are required to send and receive by [illegible]. Practice [illegible] around station; [illegible]. Training sent visual signals. Practice [illegible].

(b) Radio: Elementary principles of [illegible] to know the [illegible] Instrument. Demonstration of use of [illegible] Note on use and care of airplane wireless [illegible].

3. [illegible]:

(a) [illegible] is required to know the nomenclature of the gun, [illegible] dry and tests in sighting, etc., are required. [illegible] practice. Shooting on [illegible]. [illegible] of machine guns disposed and [illegible].

(b) Fighting in the Air: A discussion of aerial tactics.

(c) Bombing: Bases and detonators, various types of bombs, [illegible], [illegible], [illegible], [illegible], [illegible], etc.

4. Aids to Flight:

(a) Theory of Flight: A brief outline of the History of Flying with especial emphasis on the development of the airplane. The fundamental principles of aerodynamics taught graphically without the use of formulae.

(b) Cross-country Flying: Elementary lectures; instructions for cross-country flight, action on a forced landing, reports.

(c) Map Reading: Conventional signs, orientation, etc. Discussion of maps used at the front. Map interpretation emphasized, students go on field trips and are shown how to use maps.

(d) Meteorology: Fundamental principles only - pressure, cloud formations, weather predictions, reasons for "bumps" and when to expect them.

(e) Night Flying: One lecture and a night observation in astronomy - aiming to give a knowledge of a few of the conspicuous Northern constellations and planets. Landing grounds, flares, etc.

(f) Instruments and Compasses: Brief description of various instruments used on an airplane. Calculation of compass courses.

5. Airplanes:

(a) Types of Machines: A lecture aiming to give the pupil an idea of some service machines, their characteristics and purposes. Lecture on the properties and uses of woods, metals and fabric in airplane manufacture.

(b) Nomenclature of Airplanes: The student is required to be able to give andthoroughly to understand all definitions included in the list given in "Report No.9 of the National Advisory Committee for Aeronautics".

(c) Rigging: How to align a machine. Practice in assembling and disassembling.

(d) Care of Machine: The aim of this lecture is to impress upon the student necessity for the proper treatment of machines. Rules for proper care of a hangar.

machines". Units for Boyle, Ohm or J Maxwell.

on the salient measuring for the Robert Lambert

mostor".

. . . the Imperial Advisory Committee . . .

definitions learned in the list given in "Chapter

. . . . . accurately to model

. . . . . clear instructions.

(a) Types of Machines: A feature almost to give the

small en item of some service

(b) Use-economy Aging: Plumbers locations; testing-

. . . . . formation.

. . . . . mistyping". The Timekeeper Electronics or

. . . . . operating economic on the overlapping

(c) Other Conventional signs, conjunction, etc.

handing, recorde.

(a) Type of Machine: One feature and a night

. . . . . Instrument Principles only -

. . . . . pressure, plural formation, member Description,

(b) Use-economy: Investment Principles only -

description economic, economic to on rigid tips

. . . . . possession of mass used at the front. Dep inter-

. . . . . .

(c) Other Conventional signs, conjunction, etc.

. . . . . .

(a) Types of Machine: One feature and a night

. . . . . .

(b) Use-economy Aging: Plumbers locations; testing-

. . . . . formation.

. . . . . mistyping". The Timekeeper Electronics or

. . . . . operating economic on the overlapping

(e) Repair of Machines: Practical work in making wire and rope splices, patching torn wings, mending broken longerons, and soldering. Proper use of tools.

6. Engines:

(a) The principles of internal combustion engines, two-cycle and four-cycle principle, carburetion, ignition, etc. Rotary and stationary aeronautical motors.

(b) Laboratory work: Sketching of parts. Students assemble, disassemble, overhaul and clean airplane engines.

(c) Care of engines and tools: Proper care of engines with especial emphasis on the proper use and care of tools.

(d) Types of engines.

(e) "Trouble shooting".

7. Aerial Observation:

(a) Lectures on co-operation of aircraft with artillery. Discussion of map-squaring, clock-code and code signals.

(b) Practical Application of the above on miniature ranges where students are placed in gallery above a map painted to represent the ground as it looks from six to eight thousand feet. Lights arranged to simulate gun flashes.

(c) Reconnaissance: Discussion of the various types of reconnaissance, how conducted and the duties of a reconnaissance pilot.

(d) Lectures on co-operation of aircraft with infantry; methods of signalling.

(e) Photography: How to make photographs from the air, types of cameras, interpretation of trench photographs.

Appendix No.

8. General Remarks:

The course of study ordinarily lasts eight weeks and is divided into a Junior Wing of three weeks and Senior Wing of five weeks. The work of the Junior Wing consists of intensive training in Military discipline and drill, accompanied by a daily lecture on some military topic, daily instruction in the use of the machine gun and daily instruction in wireless telegraphy.

The work of the Senior Wing includes theoretical and practical instruction in military aeronautics as set forth in the course of study.

9. Examinations:

No candidate will be sent to a flying school who has not passed all final examinations in the ground school. Candidates who fail but have an excellent record for conduct and diligence may at the option of the Commandant be permitted to repeat examinations. Those who fail to pass or whose record for conduct and diligence is not creditable will be recommended for discharge. Successful candidates are marked as having passed, or passed with honor, and are given certificates of graduation issued by the Chief Signal Officer on the recommendation of the Commandant of the School.

10. Organization:

The organization of a School of Military Aeronautics includes a Commandant, who is an Army officer selected by the Chief Signal Officer to be the commanding officer of the Post at which the school is located. Assisting him is an Adjutant and a Supply officer and a President of the Academic Board appointed by the President of the University or technical school which is under contract with the War Department to give the tuition called for in the prescribed curriculum for U.S. Schools of Military Aeronautics.

For the purposes of administrative drill and discipline the candidates at the Schools of Military Aeronautics are organized as a Regiment of two Wings, divided into three and five Squadrons respectively. Each squadron consists of the members of one class divided into three Flights. Acting Regimental, Wing, Squadron and Flight officers and non-commissioned officers, are temporarily appointed from the candidates. Candidates are quartered in barracks, and eat at a regular mess.

The system of discipline follows that of the Military Academy at West Point so far as practicable. Calisthenics and infantry drill are required daily in addition to the course of technical study.

11. The objects of the Schools of Military Aeronautics are:

1. To teach candidates their military duties and develop soldierly qualities.
2. To eliminate those who are mentally or morally unfitted to become flying officers.
3. To give the necessary preliminary training in military aeronautics.

By direction of the Chief Signal Officer.

Hiram Bingham,

Major, A.S.,S.C., U.S.R.
Dir.Sch. Mil. Aeronautics.

Appendix No. F4.

WAR DEPARTMENT
Office of the Chief Signal Officer
Washington

Air Division
Schools Section
Seventh Floor
119 D St. N. E.

September 28, 1917

MEMORANDUM NO. 202 FOR ALL SCHOOLS:-

It is now over three months since the revised curriculum for the U.S. Schools of Military Aeronautics (Revised June 11th) was sent out. In the meantime careful study has been made of conditions at the ground schools and flying schools. Many different recommendations have been received from various quarters. The enclosed plan has been finally approved by Brigadier General B. D. Foulois, General Officer in Charge of the Air Division.

Twenty-five copies of the new course of study, revised to September 21st, are enclosed herewith, together with a supplement thereto showing the hours required in each subject and the weeks in which these hours are to be given.

You are directed to put this course of study into effect as soon as it can conveniently be done, but in any case not later than the 1st of December, and earlier if possible.

It is recommended that you commence putting it into effect with the class entering Saturday, September 29th, so that by the end of November all classes will be operating under the new course of study and curriculum.

The principal changes are a considerable increase in the amount of instruction in Military Studies, Theoretical; an elimination of one or two minor studies such as Transportation by Motor, an increase in the number of hours devoted to laboratory instruction in Engines and Airplanes, and a rearrangement of two examination groups.

The old groups, Theory of Flight and Cross Country and General Flying, did not prove to be satisfactory and two new groups entitled "Aids to Flight" and "Airplanes" have been substituted in their stead. Most of the material formerly given under "Theory of Flight" has been reassembled under the general heading "Airplanes" and most of the material formerly given under "Cross Country and General Flying" has been reassembled under "Aids to Flight".

The number of instruction hours has been increased, the increase coming in Laboratory periods rather than in lecture.

The course of study is now based on nine hour working day for the students,

No. 202

except _ rday and Sunday. Of this four hours come in the morning, three hours in the afternoon and two hours study in the evening. It is realized that this is a highly strenuous program, but it is not any more strenuous than the Service which cadets are endeavoring to enter. Men who cannot stand the strain of these eight weeks had better not be given the expensive flying instruction which flying officers must receive.

Another change that will be noted is in the time set for the examinations. There are as at present two tests and one final examination at the end of the third week, the tests being in Signalling and Gunnery, and final examination in military studies. These must be passed before a student can be advanced to the Senior Wing. Two important final examinations are now placed at the end of the sixth week in the important subjects of Engines and Airplanes. The work in these subjects is concentrated in the three preceding weeks. Failure to pass these necessitates doing the work over again. Four final examinations are placed in the eighth week. It is not intended that there should be a final examination on Friday afternoon or Saturday morning of the eighth week. Actual firing of machine guns should be limited to students in Squadron H and should be concentrated at the end of the week. It is believed desirable to devote Saturday morning entirely to this purpose. Although students will have taken all their examinations, it is believed that their interest in the actual firing of machine guns will not be lessened thereby. Actual practice with the radio field pack set should preferably be given on Friday of Squadron H.

It will be noted that the more important military subjects are reserved for Squadron G and H., which consist of men who have already been successful in passing three final and two preliminary tests.

It is suggested that no lectures be over forty minutes in length and that the remaining ten minutes be devoted to a written or oral quiz. This is not, however, to be regarded as a hard and fast rule.

It is particularly important that the fact be emphasized that cadets are to become <u>officers</u> of the Army of the United States and must be thoroughly familiar with military subjects.

Great emphasis must also be laid on their skill in handling a machine gun and their ability to make <u>accurate</u> reports of <u>anything</u> that they do.

It is believed that this schedule is so heavy that there should be no attempt made to hold voluntary classes in French or other topics except for remarkably well prepared students who are maintaining a high average in their studies. It is furthermore recommended that every effort be made to promote the health and efficiency of the cadets by insisting on first-class conditions in barracks and at mess. At least eight hours should be allowed for sleep and every effort must be made to prevent interruption and annoyance during both sleeping and working hours. Sports should be encouraged on Saturday afternoon whenever it is

possible and desirable. Daily calisthenics will be rigidly enforced.

It should be the first duty of the Commandant to see to it that the men under his command are given every opportunity to acquit themselves well in the strenuous test of character and ability provided in the eight weeks curriculum at the Schools of Military Aeronautics.

By direction of the Chief Signal Officer.

(Signed) Hiram Bingham,

Major A.S., S. C., U.S.R.

A true copy:

(Signed) J. R. Moulthrop

Capt. A.S.S.C., U.S.S.

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Appendix No. F4.

HB-BP

Air Division
Schools Section
119 D. St. N. E.

October 19, 1917

MEMORANDUM NO. 230 FOR ALL SCHOOLS:

Subject: Course of Study

1. With further reference to Stencil No. 37, September 21, 1917, and Supplement to Stencil No. 37, September 26, 1917, and Memorandum No. 202 for All Schools, your attention is invited to the following:

2. Military Studies

A thorough inspection of quarters, not only with reference to proper administration of the school but also in order to teach cadets how such inspection should be carried on, is directed for each week. Where the examination in Military Studies shows illiteracy this examination need not be repeated as there is no question that illiterate condidates are not desired for officers of the United States Army. Examining Boards occasionally allow illiterate candidates to get by them. It is the duty of the Schools of Military Aeronautics to eliminate all such as promptly as possible.

3. Signalling and Radio

The work in Radio should avoid theory. A man may be a perfectly good flying officer and not understand the theory of electricity or the principles of wireless telegraphy. He will not be called upon to repair or adjust wireless apparatus that is locked into his machine. The lecture should aim to explain in popular terms what happens; but no examination will hereafter be required on the Theory of Radio. Care must be taken to make the examination at the end of the third week in this subject entirely practical. This examination is intended to show whether or not a man is making good progress and needs more practice. A man need not be demoted one week for failing in this test and may be allowed to repeat this test the following week without having been demoted. All records of final tests must be sent promptly to the office.

4. Gunnery.

The essential feature of the instruction in Gunnery is to enable a man to be practical master of his gun. As the work proceeds there should be more and more attention paid to working blindfolded and under adverse conditions such as being tightly strapped in a chair as he would be in an airplane , heavily encumbered with a heavy coat, preferably a leather coat, and wearing heavy woolen gloves. Even so it is practically impossible to make the conditions as difficult as they are actually in fighting in the air. The examination at the end of the third week should test a man's accuracy and ability to learn. The final examination should be based on the relative number of hours that have been used in this subject. The principal part of the final examination should be a man's skill in handling his weapon rather than his ability to talk about the composition of the bomb or the theory of aerial tactics.

bomb or the theory of aerial tactics.

The principal part of the final examination should be a test of skill. Even so it is practically impossible to make the conditions as difficult as being strapped in a chair as he would be in an airplane, nearly every man to be practical master of his gun. As the work proceeds there should need not be demoted one week for failing in this test and may be allowed to repeat tests must be sent promptly to the office.

4. Gunnery.

The essential feature of the instruction in Gunnery is to enable a flying officer and not understand the theory of electricity or the principles of Radio. Care must be taken to make the examination at the end of the

; he will not be called upon to repair or adjust

. The course should aim to explain

as promptly as possible.

5. Military Law

Under Section 2 the Colonels of Military Regiments to eliminate all

. Under Section Command only allow illiterate candidates

illiterate candidates are not desired for officers of the

studies show illiteracy this examination need not be exploited as there is no should be carried on, is directed for each week. Where the examination in military Administration of the school but also in order to teach cadets how such inspection

3. Military Aeronautics

All Colonels, your attention is invited to the following:

1. With current reference to Circular No. 9, Department, dated

Subject: Course of Study.

DEPARTMENT OF MD. 800 AIR SERVICE:

Air Division

5. Aids to Flight.

In Aids to Flight, emphasis should be laid on map reading. It is of the utmost importance that an aviator be able to interpret quickly and orient himself correctly on a map. If this has been thoroughly learned on the ground by tramps in the vicinity or from neighboring heights, good practical results ought to be obtained.

6. The subjects of Airplanes and Engines are given in the fourth, fifth and sixth weeks, in order to discover whether a candidate has the technical ability to learn to properly handle his airplane and engine. Just as the examinations at the end of the third week are aimed to show whether a man is mentally alert and has received sufficient education to enable him to become an officer in the United States Army, even though he has not had the opportunities of much schooling, so the examinations at the end of the sixth week should be aimed at determining whether a candidate can readily acquire technical knowledge. Just as it is expected that candidates of poor mentality will be eliminated by the examinations in Junior Wing, so it is expected that candidates without technical ability will be eliminated by the examinations at the end of the sixth week and that no one who reaches the more advanced military aeronautics in the seventh and eighth weeks, which contain so much confidential material, will be unable to grasp them and pass the final examinations. Furthermore, by all possible means, develop and test the candidates powers of observation.

7. At present altogether too large a percentage of the discharged men are allowed to take the entire course. with the rearranged schedule it is believed that this custom will be remedied and that with the constantly increasing percentage of discharged men, there will be a large number eliminated at the end of three or four weeks as the case may be and that the reaminder will be eliminated at the end of six or, by demotion, seven weeks, so that none of those who are mentally unfit may receive the confidential instruction set for the seventh and eighth weeks.

8. It is noted that reports from the majority of the Schools of Military Aeronautics indicate that the new schedule will go into effect in its entirety by the middle of November without waiting for the first of December. This speed in putting the new course of study into effect is greatly appreciated. Attention is invited to that paragraph in Memorandum No. 202 which directs that the course of study will be put entirely into effect not later than the first of December. This paragraph in connection with the one which follows it has been correctly interpreted to mean that by the latter part of November all classes will be operating under the new course of study and curriculum.

9. Information is requested as to the exact date on which the class of December 1st will have completed its examinations in Engines and Airplanes. The contingency may arise requiring all men who have completed that much of the course to proceed at once to the flying schools.

By direction of the Acting Chief Signal Officer.

A true copy.
(Signed) J. R. Moulthrop
Captain, A.S. S.C., U.S.R.

(Signed) Hiram Bingham,
Major, A.S.,S.C., U.S.R.
O. I. C. Schools Section.

6. The subjects of Airplance and engines are given in the course, viz: the sixth weeks, in order to discover whether a candidate has the technical ability to learn to properly handle his airplane and engine. Just as the examinations at [illegible] even though he has not had the opportunities of much schooling, by the practical, will be eliminated by the examinations in Junior Week, [illegible] without technical ability will be [illegible] observation.

7. At present altogether too large a percentage of the discharges are [illegible] this custom will be remedied. There will be a large number eliminated at the end of three or four weeks as the case may be and that [illegible] ranged men. By correction, seven weeks, at [illegible] for the seventh and eighth weeks.

8. [illegible] quantity of the methods of [illegible] during the new course of study into effect is greatly appreciated. Attention is [illegible] to mean that by the latter part of November all classes will [illegible] the new course of study and examinations.

9. Information is requested as to the exact date on which [illegible] December 1st will have completed its examinations in Engines and Airplanes.

[illegible] to the Flying School.

[illegible] Captain, A.S. S.C., U.S.R.

(Signed) H. R. Montague
[illegible]

(Signed) Hiram Bingham
[illegible] for, A.S.S.C., U.S.A.

[illegible]

endix No. F4.

Air Div. Schools Section WAR DEPARTMENT HB-BP
Office of the Chief Signal Officer

November 5, 1917.

BULLETIN No. 75 to all Schools:

Subject: Curriculum revised November 1, 1917.

1. Military Studies:

The importance of a weekly hour devoted to careful inspection and training in inspection needs emphasis and has been provided for in the new schedule. In all cases where men show that they are good soldiers and do not need the four hours per day infantry drill prescribed for Junior wing, they may, at the option of the Commandant, be excused from all but one hour per day and assigned to other military duties such as practice in Army paper work, trap shooting, target practice with .22 rifle, pistol shooting and drill of awkward squads.

2. Signalling.

After conferences with flying officers, it has been decided to abandon the practical radio field work. All field sets and table sets supplied by the Signal Corps are to be packed and prepared for shipment to whatever point is designated by the Land Division of the Signal Corps. It is important to lay great emphasis on procuring buzzers and keys of proper type so that there may be at least enough keys to provide one key for every two men in the school. The lectures should not deal with the theory of radio except insofar as is necessary to have the men understand why it is essential to fly straight towards the batteries that they are talking to. There should be further taken up a description of the wireless apparatus on the airplane, method of handling the aerial and the importance of not touching that part of the apparatus which belongs to the Radio Division and does not concern the pilot. It will be noticed that the time for the examination has been cut down since there is to be no examination given on radio theory.

3. Gunnery.

The hours for instruction in gunnery have been increased to enable more time to be given to practice in firing with machine gun in order to acquire greater efficiency in remedying stoppages that have been superinduced by poor ammunition. Commandants are requested to report how many rounds of ammunition can be effectively handled per candidate in the time allotted. It is not recommended that candidates do actual firing before the fifth or sixth week but become expert in handling the gun blindfolded before they are given an opportunity to do any firing. Candidates who develop unusual ability should be given an opportunity to do trap shooting or target practice with .22 rifle. There must be as much actual shooting as is consistent with good instruction in the fundamentals. It has now been possible to get the order for Vickers guns approved and Vickers guns should arrive at the schools before long. Since, however, the Vickers gun is not handled so much by the pilot as the Lewis gun, it will not require so much attention.

4. Aids to Flight.

The subjects "Theory of Flight", "Cross Country Flying " and "Night Flying" are more properly a part of the next group, "Airplanes", than of this group, but are placed in this group in order to equalize the number of hours in examination groups. The subject of Cross Country Flying is to be given in an entertaining rather than a didactic manner since lectures, to be of value in this topic, must immediately precede an actual cross country flight. The subject "Theory of Flight" should be given more with the idea of laying emphasis on the natural stability of the modern airplane than anything else. Here is a chance to give the man confidence in the horse he is going to ride. The more important details of night flying practice are to be retained for students in the seventh and eighth weeks so as to avoid giving this and similar subjects to men who are going to be weeded out by examinations at the end of the sixth week.

5. Airplanes

The hour marked for types of machines is to be devoted to a test of the student's ability to use the book "Silhouettes of airplanes" which is placed in his hands when he enters the school. Failure to pass this test will not be regarded as a serious matter but rather as a matter of record. This test need not be repeated if it is not passed. The object of this test is to bring out those men who have retentive visual memory. Encourage the poor men to develop this faculty. The general topic of modern machines is to be treated under the subject "Theory of Flight". It is appreciated that the teacher in charge of this department may also be responsible for the courses "Theory of Flight", "Cross Country Flying" and "Night Flying" that are given in group 4, "Aids to Flight ", whenever this appears to the Commandant to be necessary.

6. Engines.

It has been necessary to slightly reduce the amount of time devoted to shop work in engines. It is hoped, however, that with the increased number of engines with which it is now possible to provide the schools, there may be more effective teaching of this subject, since less time is wasted by having too many men around one engine. It is not wise to devote much time to trouble shooting since this subject can be more effectively taught at the flying schools.

7. Aerial Observation.

The only change here is an increase of one hour in the subject of photography in order to enable illustrated lectures to be given showing photographs taken from the air and the uses made of them as pointed out by Major Campbell. It is possible that these four lectures in photography can be given in four half-hour periods if convenient, thereby gaining a little leeway in the eighth week.

8. Commandants are requested to put the revised curriculum into effect as soon as possible, notifying this office by letter as soon as the entire eight squadrons are operating under the new curriculum.

By direction of the Acting Chief Signal Officer.

Hiram Bingham,
Lt. Col., Signal Corps.

A true copy.

(Signed) John H. Alden

Captain, A.S., S.C., U.S.R.

-2-

B-S.

WAR DEPARTMENT
Office of the Chief Signal Officer
Washington

November 12, 1917.

MEMORANDUM NO. 347 for all Schools:

General Summary of Remarks on the Course of Study in the Schools of Military Aeronautics.

1. The examinations at the end of the third week are aimed to show whether a man is mentally alert and has received sufficient education to enable him to become an officer in the United States Army, even though he has not had the opportunities of such schooling, so the examinations at the end of the sixth week should be aimed at determining whether a candidate can readily acquire technical knowledge. Just as it is expected that candidates of poor mentality will be eliminated by the examinations in Junior Wing, so it is expected that candidates without technical ability will be eliminated by the examinations at the end of the sixth week and that no one who reaches the more advanced military aeronautics in the seventh and eighth weeks, which contain so much confidential material, will be unable to grasp them and pass the final examinations. Furthermore, by all possible means, develop and test the candidates powers of observation.

At present altogether too large a percentage of the discharged men are allowed to take the entire course. With the rearranged schedule it is believed that this custom will be remedied and that with the constantly increasing percentage of discharted men, there will be a large number eliminated at the end of three or four weeks as the case may be and that the remainder will be eliminated at the end of six or, by demotion, seven weeks, so that none of those who are mentally unfit can receive the confidential instruction set for the seventh and eighth weeks.

2. Military Studies. It is particularly important that the fact be emphasized that cadets are to become officers of the Army of the United States and must be thoroughly familiar with military subjects.

Great emphasis must also be laid on their ability to make accurate reports of anything that they do.

3. Military discipline goes hand in hand with practical military work. You can not have the best practical work without good military discipline and, on the other hand, good practical military instruction is the only way to produce military discipline.

If the best practical work, and therefore, the best military discipline is to be imparted to the men at the ground schools in the very short time available it is self evident that the instructors in the Military Department must be of the very best.

The organization of this Military Department must be perfect. Since military discipline is secured by practical military work and practical military work has some bearing on everything the man does in twenty four hours, it follows at once that the military studies department should have control over the men

It is self evident that the instructors in the Militar

except when in class rooms of the other departments. It then follows that the head of this department should report to the Commandant direct.

4. A thorough inspection of quarters, not only with reference to proper administration of the school but also in order to teach cadets how such inspection should be carried on, is directed for each week. Where the examination in Military Studies shows illiteracy this examination need not be repeated as there is no question that illiterate candidates are not desired for officers in the United States Army. Examining Boards occasionally allow illiterate candidates to get by them. It is the duty of the Schools of Military Aeronautics to eliminate all such promptly.

5. In all cases where men show that they are good soldiers and do not need the four hours per day infantry drill prescribed for Junior Wing, they may, at the option of the Commandant, be excused from all but one hour per day and assigned to other military duties such as practice in Army paper work, trap shooting, target practice with .22 rifle, pistol shooting and drill of awkward squads.

6. Signalling and Radio. The work in radio should avoid theory. A man may be a perfectly good flying officer and not understand the theory of electricity or the principles of wireless telegraphy. He will not be called upon to repair or adjust wireless apparatus that is locked into his machine. The lecture should aim to explain in popular terms what happens; but no examination will hereafter be required on the Theory of Radio.

The lectures should not deal with the theory of Radio except insofar as it is necessary to have the man understand why it is essential to fly straight towards the batteries that they are talking to. There should follow a description of the wireless apparatus on the airplane method of handling the aerial and the importance of not touching that part of the apparatus which belongs to the Radio Division and does not concern the pilot.

Care must be taken to make the examination at the end of the third week in this subject entirely practical. This examination is intended to show whether or not a man is making good progress and needs more practice. A man need not be demoted one week for failing in this test and may be allowed to repeat this test the following week without having been demoted. All records of final tests must be sent promptly to this office.

7. It is important to lay great emphasis on procuring buzzers and keys of proper type. There should be at least enough keys to provide one key for every two men at the school.

8. Gunnery. The essential feature of the instruction in Gunnery is to enable a man to be practical master of his gun. As the work proceeds there should be more and more attention paid to working blindfolded and under adverse conditions such as being tightly strapped in a chair as he would be in an airplane, heavily encumbered with a heavy coat, preferably a leather coat, and wearing heavy woolen gloves. Even so it is practically impossible to make the conditions as difficult as they are actually in fighting in the air. The examination at the end of the third week should test a man's accuracy and ability to learn.

The hours for instruction in gunnery have been increased to enable more time to be given to practice in firing with machine gun in order to acquire greater efficiency in remedying stoppages that have been superinduced by poor ammunition. It is not recommended that candidates do actual firing before the fifth or sixth week but become expert in handling the gun blindfolded before they are given an opportunity to do trap shooting or target practice with .22 rifle. There must be as much actual shooting as is consistent with good instruction in the fundamentals.

The final examination should be based on the relative number of hours that have been used in this subject. The principal part of the final examination should be a man's skill in handling his weapon rather than his ability to talk about the composition of the bomb or the theory of aerial tactics.

9. Aids to Flight. In Aids to Flight, emphasis should be laid on map reading. It is of the utmost importance that aviator be able to interpret quickly and orient himself correctly in a map. If this has been thoroughly learned on the ground by tramps in the vicinity or visits to neighboring heights, good results ought to be obtained.

The subjects "Theory of Flight", Cross Country Flying" and "Night Flying" are more properly a part of the next group, "Airplanes, than of this group, but are placed in this group in order to equalize the number of hours in examination groups. "Cross Country Flying" is to be given in an entertaining rather than a didactic manner since lectures, to be of value in this topic, must immediately precede an actual cross country flight. "Theory of Flight" should be given more with the idea of laying emphasis on the natural stability of the modern airplane than anything else. Here is a chance to give the man confidence in the horse he is going to ride. The more important details of night flying practiced are to be retained for students in the seventh and eighth weeks so as to avoid giving this and similar subjects to men who are going to be weeded out by examinations at the end of the sixth week.

The subjects of Airplanes and Engines are given in the fourth, fifth and sixth weeks, in order to discover whether a candidate has the technical ability to learn to properly handle his airplane and engine.

10. Airplanes. The hour marked for types of machines is to be devoted to a test of the students ability to use the book "Silhouettes of Airplanes" which is placed in his hands when he enters the school. Failure to pass this test will not be regarded as a serious matter but rather as a matter of record. This test need not be repeated if it is not passed. The object of this test is to bring out those men who have retentive visual memory. The general topic of modern machines is to be treated under the subject "Theory of Flight". It is appreciated that the teacher in charge of this department should also be responsible for the courses "Theory of Flight", "Cross Country Flying" and "Night Flying" that are given in group "4", "Aids to Flight", whenever this appears to the Commandant to be necessary.

11. Engines. It is not wise to devote much time to trouble shooting since this subject can be more effectively taught at the flying schools. Propellers are not to be used on engines that are operated.

12. Aerial Observation. Illustrated lectures are to be given showing photographs taken from the air and the use made of them as pointed out by Major Campbell. It is possible that these four lectures in photography can be given in four half-hour periods if convenient, thereby gaining a little leeway in the eighth

week.

By direction of the Acting Chief Signal Officer.

Hiram Bingham

Lt. Col., Signal Corps.

A true copy,
(Signed)John H. Alden
Captain, A.S., S.C., U.S.R.

APPENDIX F5

Contains the following:

Curriculum of March 1, 1918 (Stencil No. 129) - (2 pages)
Curriculum of April 1, 1918 (Stencil No. 157) - (2 pages)
Syllabus of Course of Study for April 1, 1918 - (26 pages)
Memorandum No. 236 - (2 pages)
Memorandum No. 297 - (2 pages)

Appendix F5

Stencil No. 129
(Superseding Stencil 37, and its supplements dated Sept. 26 and Nov. 1, 1917)

W A R D E P A R T M E N T

Office of the Chief Signal Officer
WASHINGTON
Air Division
Schools Section.

CURRICULUM FOR THE U.S. SCHOOLS OF MILITARY AERONAUTICS
Revised March 1, 1918

		12 weeks course.											
	T	1	2	3	4	5	6	7	8	9	10	11	12	T
(1) MILITARY SUBJECTS														
Practical*	135	22½	22½	12½	12½	12½	7½	7½	7½	7½	7½	7½	7½	
Theoretical	40	6	4	3	3	3	3	3	3	3	3	3	3	
Weekly Inspection	12	1	1	1	1	1	1	1	1	1	1	1	1	
Examination	3	-	-	-	1	-	-	-	-	-	-	-	2	190
(2) SIGNALLING														
Practical	40	5	5	3	3	3	3	3	3	3	3	3	3	
Radio Apparatus	2	-	-	-	-	-	2	-	-	-	-	-	-	
Examination	2	-	-	-	1	-	-	-	-	-	-	-	1	44
(3) GUNNERY														
Practical	50	-	-	4	5	5	6	4	5	5	6	5	5	
Examination	2	-	-	-	-	-	1	-	-	-	-	-	1	52
(4) AIRPLANES														
Theory of Flight	6	-	2	2	1	1	-	-	-	-	-	-	-	
Meteorology	3	-	-	1	1	1	-	-	-	-	-	-	-	
Rigging	22	2	2	4	4	4	2	2	-	-	-	2	-	
Repair of Machines	8	-	-	-	-	-	-	2	2	-	2	2	-	
Instruments	4	-	-	-	-	-	-	-	2	2	-	-	-	
Types of Machines	2	-	-	-	-	-	-	2	-	-	-	-	-	
Examination	2	-	-	-	-	-	-	-	-	-	-	2	-	47
(5) ENGINES														
Principles	8	-	-	2	2	2	2	-	-	-	-	-	-	
Laboratory	42	-	-	4	2	4	8	6	6	-	2	2	8	
Care of Engines	2	-	-	-	-	-	1	1	-	-	-	-	-	
Types of Engines	1	-	-	-	-	-	-	1	-	-	-	-	-	
Examination	2	-	-	-	-	-	-	-	-	-	-	-	2	55

Ix Division

Revised March 1, 1976

12 weeks courses

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	T	1	2	2	4	5	6	7	8	9	10	11	12	T
(6) AERIAL TACTICS														
Pursuit	1	-	-	-	-	-	-	1	-	-	-	-	-	
Bombing	2	-	-	-	-	-	-	1	1	-	-	-	-	
Reconnaissance	2	-	-	-	-	-	-	-	-	1	1	-	-	
Coop. Infantry	1	-	-	-	-	-	-	-	-	-	1	-	-	
Map Reading	14	-	-	-	-	-	-	2	4	2	4	2	1	
Coop. Artillery	4	-	-	-	-	-	-	-	-	4	-	-	-	
Artillery Obs. Range	14	-	-	-	-	-	-	-	-	6	6	2	-	
Photography	6	-	-	-	-	-	-	-	2	2	-	2	-	
Examination	2	-	-	-	-	-	-	-	-	-	-	2	-	46
TOTALS	434	36½	36½	36½	36½	36½	36½	36½	36½	36½	36½	35½	33½	434

)7) Supervised Recreation and Organized Sports-- 2 hours daily, including (1) Inter-squadron contests in football, soccer, basketball, baseball, track athletics or hockey, according to season. (2) Informal Sports: track athletics, tennis, boxing, wrestling, fencing, gymnastics, rowing, swimming, etc., according to season and facilities. (3) Trap shooting, or target practice with rifle or pistol.

*One-half hour each day devoted to Ceremonies such as Guard Mount, Parade, Review, Retreat, etc. Each cadet to perform at least one complete tour of guard duty. Calisthenics at least one-half hour, preferably in the morning, taken from the drill period.

Appendix No. F5 ~~F5~~

Stencil No. 157.
(Superseding Stencil No. 129)

WAR DEPARTMENT
Office of the Chief Signal Officer
WASHINGTON
Air Division
Training Section, Schools Branch.

CURRICULUM FOR THE U.S. SCHOOLS OF MILITARY AERONAUTICS.
Revised April 1, 1918.

Subjects	T	1	2	3	4	5	6	7	8	9	10	11	12	T
(1) MILITARY SUBJECTS														
Practical *	135	22½	17½	10	10	10	10	10	10	10	10	7½	7½	
Theoretical	41	6	4	4	4	4	4	4	4	4	3	-	-	
Inspection	12	1	1	1	1	1	1	1	1	1	1	1	1	
Examination	2	-	-	-	-	-	-	-	-	-	2	-	-	190
(2) SIGNALLING														
Practical	39	5	4	3	3	3	3	3	3	3	3	3	3	
Radio Apparatus	2	-	-	-	-	-	2	-	-	-	-	-	-	
Examination	2	-	-	-	-	-	-	-	-	-	-	-	2	43
(3) GUNNERY														
Practical	50	-	-	4	5	5	6	4	5	5	6	5	5	
Examination	2	-	-	-	-	-	-	-	-	-	-	-	2	52
(4) AIRPLANES														
Theory of Flight	6	-	2	2	1	1	-	-	-	-	-	-	-	
Meteorology	3	-	-	1	1	1	-	-	-	-	-	-	-	
Rigging	26	2	4	6	4	6	2	2	-	-	-	-	-	
Repair of Machines	12	-	-	-	-	-	-	2	4	2	2	2	-	
Types of Machines	2	-	-	-	-	-	-	2	-	-	-	-	-	
Instruments	4	-	-	-	-	-	2	2	-	-	-	-	-	
Examination	2	-	-	-	-	-	-	-	-	-	-	2	-	55
(5) ENGINES														
Principles	9	-	2	2	2	1	-	2	-	-	-	-	-	
Types of Engines	2	-	-	-	-	1	1	-	-	-	-	-	-	
Laboratory	46	-	2	4	6	4	6	4	6	4	-	6	4	
Examination	2	-	-	-	-	-	-	-	-	-	-	-	2	59
(6) OBSERVATION														
Map Reading	16	-	-	-	-	-	-	-	4	4	2	4	2	
Coop. Artillery	5	-	-	-	-	-	-	-	-	3	2	-	-	
Artillery Obs. Range	16	-	-	-	-	-	-	-	-	-	6	6	4	
Examination	2	-	-	-	-	-	-	-	-	-	-	-	2	39
	438	36½	36½	37	37	37	37	36	37	36	37	36½	34½	438

(7) Supervised Recreation and Organized Sports - 5 hours a week, including (1) Inter-squadron contests in football, soccer, basketball, baseball, trac athletics or hockey, according to season; (2) Informal sports: track athletics, tennis, boxing, wrestling, fencing, gymnastics, rowing, swimming, etc., according to season and facilities; (3) Trap shooting, or target practice with rifle or pistol.

* One-half hour each day devoted to Ceremonies such as Guard Mount, Parade, Review, Retreat, etc. Each cadet to perform at least one complete tour of guard duty. Calisthenics at least one-half hour, preferably in the morning, taken from the drill period.

SYLLABUS FOR MILITARY SUBJECTS IN UNITED STATES
SCHOOLS OF MILITARY AERONAUTICS.
April 1, 1918

I. MILITARY SUBJECTS

1. Practical Course

a. Daily Infantry Drill through the School of the Company, Ceremonies and Guard Duty.

The purpose of this is primarily disciplinary but also aims to give that knowledge of the drill regulations which every officer should have to enable him to take command of a small body of troops or to participate in ceremonial formations. The first ten days, drill should be under the personal supervision of the most competent officer available. After the first ten days, every cadet should be given frequent opportunity to command a squadron at drill and his performance should be carefully noted and marked by a competent officer. A great deal of attention should be paid to the ceremonial side of military life. One-half hour each day should be devoted to ceremonies such as Formal Guard Mount, Parade, Retreat, etc. Each squadron in turn should hold a formal guard mount, witnessed by the other squadrons, and each cadet should have at least one complete tour of guard duty.

Each cadet should be taught the Manual of Arms provided the necessary arms are available. As there will probably not be sufficient for the entire command, this should be taught to men individually or in Squad when they enter the School. Arms will be used in guard duty, if available. As the supply of arms will be greatly limited the Commandants will have to use their best judgment in apportioning the time for instruction.

b. Physical Training.

This training should be sufficient to keep the men in good physical condition and should also be treated as a disciplinary exercise. There should be a period of calisthenics of one-half hour each day, preferably before noon. This exercise should be most carefully supervised. It is even more important for purposes of discipline than as physical exercise. The student officers of the School should not be depended upon to conduct these exercises. Either an officer or a noncommissioned officer should conduct them. The work of individual cadets should be carefully noted with respect to their spirit and efficiency. (Use and follow carefully Manual of Physical Training, U.S. Army.)

c. First Aid.

There should be enough first aid drill or demonstration to give the cadet a fair amount of efficiency in the practical application of the matters covered in the lectures on Military Hygiene; e.g., bandaging, applying splints, etc. Not more than four of the hours set aside for drill should be devoted to this, the remaining time being taken from the study hours, the amount to be optional with the Commandants. Cadet officers who show proficiency in this work may be utilized in instructing others. It is suggested that this instruction be given in small groups, under the direction of the Medical Officer.

App.

2. Theoretical Course 41 hours.

a. Military Discipline and Esprit de Corps 1 hours

References: U.S. Army Regulations, Article 1; Manual of Military Training (Moss), Paragraphs 12, 13, 910-916; Officers' Manual, (Moss), Chapters XXII and XXIII; A Manual for Courts-Martial, par, 333; Infantry Drill Regulations, U.S.Army, Par. 6; An Officer's Notes (Parker), Chapter II, p.49; The Plattsburg Manual (Ellis and Carey) pp. 17, 216; Fundamentals of Military Service (Andrews), Chapters II, III and V. The reasons for discipline and the results of the lack of it and matters of the highest importance. In the Air Service, its importance should be continually reiterated throughout the course.

It must be remembered that the Schools are not training "aerial chauffeurs" or "exhibition flyers" but officers of the army on whose sound judgment and mental alertness lives of thousands of men will depend. Military aviators should be men of the highest character, well educated and of good physique. Emphasize the fact that the course of study is intended to be very difficult and a test of unusual ability. This and the following lectures should be given by the Commandant.

b. Military Courtesy and Ideals of the Service 1 hour.

References: Army Regulations, Article 1, par. IV and Article XL will be the basis for this lecture; Officers' Manual (Moss) Chapter II; see also references for proceding lecture. It is considered of the utmost importance that the beginning of his course a student should gain not only a thorough knowledge of discipline but also a facility in its outward expression, as exemplified by the observance of prescribed military "courtesy" and conduct. Matters such as "mess etiquette" should be gone into. Every R.M.A. is expected to be both an "officer" and a "Gentlemen".

a

c. Manual of Interior Guard Duty 2 hours

This course will be the foundation for the practical work in Guard Duty as outlined in 1 (a)

d. Administration of the United States Army 1 hour.

References: U.S. Army Regulations, Articles LVII, LVIII, LIX, LXVII, LXVIII, LXXIII, LXXIV, LXXV, LXXVI, LXXVII; National Defense Act of June 3, 1916, Sections 1, 5-17, 81; Staff Manual of United States Army.

The duties and powers of President, Secretary of War, Chief of Staff and various Staff departments.

e. Organization of the United States Army 2 hours.

References: National Defense Act of June 3 1916; Tables of Organization, January, 1918; Stencil 135. For the Air Service, Stencils 649A, 969.

These two hours should be devoted to the division of the army into various branches, including the Air Service, and the composition of the different united of these branches.

f. Military Hygiene and Sanitation 3 hours

References: Elements of Military Hygiene (Ashburn): Moss' Manual of Military Training, Part V, Chapters I, II and III; Fundamentals of Military Service (Andrews) Chapter XXIV; What a Soldier Should Know (Bolles, Jones,etc.) Chapter X;First Aid and especially Lectures on Military Sanitation and Management of Sanitary Service -- Army Service Schools.

This course is to include: 1. Personal Hygiene, including orthopedic instruction; 2. Military Sanitation and Management of Sanitary Service; and 3. First Aid - wounds of soft parts, fractures, poisons, asphyxia, and other emergencies. This course is to be given by the Medical Officer.

g. Paper Work 10 hours

References: Army Paper Work (Moss); Company Administration (Waldron); Forms furnished by A.G.O.; Engineer Training Manual, Appendix No.2; Army Paper Work Pamphlet - Perrin-Smith Printing Co., St.Louis; Company Administration (Grieves).

Instructions should be given in the following: Morning Report, Daily Sick Report, Duty Roster, Muster Roll, Pay Roll, Officers' Pay Voucher and Mileage Voucher, Ration Return, Company Return, Discharges, Certificate of Disability, Service Record, Final Statement, Survey Report, Inventory and Inspection Report, Individual Equipment Record, Correspondence. Great stress should be laid on correspondence. The Cadet should have constant drill in the actual use of the forms. This can be done by conferences in which forms are distributed to be filled out or to be corrected by the cadets. For this purpose each school should supply itself with large quantities of the forms mentioned. This will probably have to be done by mimeographed copies as the actual forms cannot be procured in large quantities from the A. G. O.

Engineer Training Manual, Appendix No. 2 should be used as basis for the work.

h. Army Regulations 7 hours

References: A.R. II, III, IV (Pars. 13, 14, 16) V, VIII, IX (49, 50, 51, 52, 54, 55, 56, 57, 63, 64) X, XI, XII, XIII, (83) XVII, XVIII, (14), XIX (116, 117, 118, 120, 129, 130, 131, 132) XX, XXI, XXII, XXIII, XXVIII (215) XXX (270-277, 283-295, 295, 327, 379-392½, 406, 407) LII, LIII (657-670, 693), LV (825, 846-877) LXXIII (1024, 1025, 1036, 1044, 1050, 1057, 1082, 1110-1134, 1146-1178, 1184, 1187, 1202-1223, 1256, 1269, 1275, 1276, 1279, 1280).

These references should be divided into two broad divisions - one treating of the enlisted man, the other of the officer. Articles XXVIII should be read. In dealing with the sections of Army Regulations covering the general subject of Practical Company Administration, the scope of the work should go beyond the Army Regulations in matters of organizing, equipping, clothing, and messing and should also take up the matter of prescribed uniforms, clothing and equipment both in

this country and for foreign service. The subject of Responsibility and Accountability in the drawing of equipment should be stressed. For this the best reference is "Quartermaster and Ordnance Supply" (University of Chicago Press) Chapter III. For Uniform regulations - Special Regulations No. 42, Stencil #494. Bulletin No. 2, Jan 25, 1918, War Department. Table of Fundamental Allowances of Quartermaster Supplies (1917)

i. Military Law 6 hours.

References: Articles of War, A Manual for Courts-Martial, especially Chapters I-XI; Military Law (Davis); Military Law and Procedure (Winthrop); U.S. Army Regulations, pars. 922-942; Digest of Opinions of the Judge Advocate General.

This should include an indication of the material that should be studied, a study of the Articles of War, Manual for Courts-Martial, and a brief study of the relation of Civil and Military Law, including Rights and Obligations of soldiers. The instruction in this course should be by means of conferences and practical problems solved during the conferences and the solutions discussed. There should also be a practical illustration of the workings of a general court-martial.

j. Methods of Modern Warfare 7 hours.

1. An outline of the methods used by the armies of today in combat, covering extended order, trench warfare and modes of attack now in use on European battle fronts. Care should be taken to correlate this course on general methods with the course in Observation which is devoted especially to the duties of the Air Service. A brief outline of the organization of the British, French, and German armies may also be included. The basis for this course will be Colonel Paul Azan's "War of Positions" and the following War College Publications already sent to the Schools.

1. Notes on Recent Operations No. 1 and No. 2.
2. Notes on Employment of Artillery in Trench Fighting.
3. Instructions on the Offensive Conduct of Small Units.
4. Notes on the methods of attack and defense to meet the conditions of modern warfare.
5. Liaison Instructions for All Arms.
6. Notes on Grenade Warfare.
7. Notes on the use of Machine Guns in trench warfare

4 hours.

2. Gas Defense.

The material for this course will be found in the following Army War College Publications.

(1) Memorandum on Gas Poisoning in Warfare with notes on the pathology and treatment.

(2) Gas Warfare.
Part I. German Methods of Offense
Part II Methods of Defense Against Gas Attacks.
Part III. Methods of Training in Defensive Measures

These three hours are to be devoted to lectures on the Use of Gas in Warfare - The Cloud Gas Attack, Gas Shells, Kinds of Gasses used and effects, General Precautionary Measures, First Aid. This theoretical work will be supplemented by four or five hours in drill, (taken from the practical course in Infantry Drill) with the gas mask as outlines in Gas Warfare, Part III. Since the cadets in the Grounds Schools are to be officers, their instruction should be such that in emergencies they could instruct recruits or civilians. 3 hours.

k. Morale 1 hour

References: Fundamentals of Military Service (Andrews) pp. 10-11, 35-38, 44, 79-80, and references in (a) and (b).
This lecture should be given towards the end of the course. Emphasis on the supreme importance of the Air Service.

l. Weekly Inspection 12 Hours.
m. Examination 2 Hours.

Explain fully that the candidate may be discharged at any time during his course of training by reason of failure to pass tests or examinations, by giving evidence to his commanding Officer that he is unfitted either mentally, morally, or physically for the duties of a flying officer, or for any other reason which shall in the opinion of the examining board, and subject to such approval as is necessary, render his services no longer desired. The actual mental and physical requirements for a flying officer are so great, his ability to do several things at once and do them all accurately is so essential, that discharge is not necessarily any reflection on the man's character, loyalty or devotion to duty. There is room only for the very best.

The references given under each course are simply suggestive and not to be regarded as exhaustive. The method of instruction in these courses should not be confined to lectures. There should be a combination of recitations, conferences and lectures. In Army Paper Work, Army Regulations and Military Law, the instruction should be almost exclusively by means of recitations, conferences and practical problems. Further references will be supplied from time to time.

SYLLABUS FOR SIGNALLING
IN
UNITED STATES SCHOOL OF MILITARY AERONAUTICS.
April 1,1918

II. SIGNALLING 43 hours.

1. The course in Practical Signalling will occupy 39 hours, about 33 of which are to be devoted to Buzzer Work, 3 hours to Lamp Signalling, and 3 hours to the Panneau. In addition to this, 2 lectures on the Use of Radio A paratus are to be given, and a further 2 hours allotted to the examination. No field work is required and no lectures on Theory of Radio.

2. The whole air of the teaching should concentrate on the practical training necessary for efficient signalling from an airplane; every phase of telegraphy not essential for pilots should be strictly eliminated. (For type of signals used see Stencil #294 pp. 22-25,31-32)

3. This means that the emphasis of the course is to be upon accuracy rather than upon speed, since for airplane signalling a moderate speed is quite sufficient but accurady is absolutely necessary, not only as regards the letters and figures, but also the spacing of groups.

4. It is important that at first the instruction should be entirely from the sound and not the sight of the code. Nothing printed or written should be used until the cadet is fairly familiar with the sound groups. It is a training of the ear that is desired.

5. Later in the course work with the silenced key should be stressed for the sake of training the touch independent of the ear. In signalling from an airplane the pilot has to rely on touch altogether.

6. Men above average proficiency are not to be held back. One group in a class may be working at better speed than the rest. Men of previous experience may be used to send to others.

7. The fast division of each Squadron will be given "passing out" tests at the end of each week at the rate of ten words per minute, the other requirements for passing the final examination remaining the same. A cadet who "passes out" passes the course provided he attends the classes in visual signalling and radio, and practices buzzer as required at least fifteen minutes each day. He will be tested in this practice at the end of each week, and a record of the tests will be kept. If the record shows that his work is falling off, more than fifteen minutes practice may be required.

8. Opportunity will be given to groups of two or more students to practice buzzer work by themselves, if they care to, in any free time.

9. Outline of Work:

a. Morse code taught by ear. Alphabet, including "ch" (- - - -). numerals, symbols for "break" (- ... -), for correction (.....), and for end of message (.-.-.). No other symbols needed. Common mistakes in forming letters. Spacing of works. Proper method of holding key, position of arm and wrist. (See Stencil 584 "ARTILLERY COOPERATION NOTES No. 7"; also Bulletin 198.)

b. Practice in sending and receiving with buzzer and Morse Recorder at least a half hour every day. Two or three days of plain English. All of the rest of the work in code. Letters and figures interspersed. Spacing of groups to be emphasized. Cadet will be taught to write all messp sages in block (printed capital) letters. Zero is to be distinguished from the letter O by a dot in the center (Ø); figure 1 will be written with a short upstroke (1) to distinguish it from the letter I.

c. During the 12 weeks' course cadets are to develop their practice in both sending and receiving to at least 10 and not more than 12 words per minute, though this ruling need not apply to cadets who have "passed out". It is a good plan several times in the course suddenly to increase the speed of receiving for a short period to keep the man alert, and t give them a standard by which to judge their own developmsnt; e.g., jump from 5 words a minute to 8 for part of an hour, andthen go back to 5 or 6.

d. Work with the Lamp and the Miniature Panneau should not begin until the seventh week, when men have attained considerable proficiency with the buzzer. A total of 6 hours is to be devoted to visual signalling. At first, single letters to be received and written down; then, groups of three or more symbols. Requirement 4 words a minute. (For description of panneau see Bulletin No. 27. (Oct. 11) and Photograph #140)

e. Two lectures on Use of Radio Apparatus in the sixth week. Parts and connections of apparatus. Importance of directional sending. Safety plug. Winding out and in of aerial. (See Stencil No.580,pp. 5 ff. and "S.S. 131", pp. 38-43

10. Final Examination.

a. Receiving; Each cadet receives buzzer code for two minutes at the rate of 8 words a minute, 5 letters to a work. A minute's practice, not counted, may precede the test. Men who receive 6 symbols wrong are graded at the passing mark, 60%. More than 6 wrong counts as failure.

b. Sending: Morse Recorder used. Men to be given list of signals in code. Signals spaced and divided into groups, with figures in different color from letters, as an aid to following with the eye. A minutes practice not counted may precede the test. Each man sends for

two minutes at the rate of 8 words a minute, 5 letters to a work. Each letter of the alphabet and each figure to occur at least once on the examination. A cadet making more than 5 mistakes fails.

c. In both sending and receiving tests intervals should occur irregularly and not uniformly at the end of five symbols. An interval omitted or misplaced should count as an error.

d. There is to be no examination on visual signalling or on the radio lectures.

App.

SYLLABUS FOR GUNNERY IN THE UNITED STATES
SCHOOLS OF MILITARY AERONAUTICS.

III. GUNNERY 52 hours.

Subjects of Instruction.

The course in Gunnery at the United States Schools of Military Aeronautics will be conducted upon the basis of this syllabus and upon the instructional notes issued by the Department of Gunnery as follows:

1. Lewis Gun: 2. Marlin Gun; 3 Ring Sights.

The time allotted by subjects is as follows:

		Time Allotted.
1.	Lewis Gun:	
(a)	General description	2 hours.
(b)	Mechanism (Notes to be given in full from stencil)	3 hours
(c)	Stripping	3 hours
(d)	Drill	3 hours
(e)	Stoppages and immediate action (Indoor work)	3 hours
(f)	Care and cleaning (Notes to be given in full from stencil).	2 hours
(g)	Aiming (To be carefully explained and thoroughly understood)	1 hour
(h)	Points before and after firing on range	2 hours
(i)	Testing magazines, ammunition, etc	2 hours
2.	Marlin Gun:	
(a)	General description	2 hours
(b)	Mechanism	3 hours
(c)	Stripping	3 hours
(d)	Drill (Loading and unloading	2 hours
(e)	Stoppages and immediate action	3 hours
(f)	Care and cleaning	3 hours
(g)	Points before and after firing on range	2 hours
3.	Ring Sights as per Stencil:	2 hours.
	Review, Lewis Gun	5 hours
	Review, Marlin Gun	5 hours
	Examination	2 hours
		52 Hours.

The time allotted by weeks is as follows:

	T	1	2	3	4	5	6	7	8	9	10	11	12	T
Practical	50	-	-	4	5	5	6	4	5	5	6	5	5	
Examination	2	-	-	-	-	-	-	-	-	-	-	-	2	52

There will be no instruction in Gunnery during the first two weeks. The third, fourth, fifty and sixth weeks will be devoted to instruction on the Lewis gun. The seventh, eighth, ninth and tenth weeks will be devoted to instruction on the Marlin gun. The eleventh week will be given to review work upon the Lewis gun and the twelfth week to review work upon the Marlin gun. During the twelfth week a final examination will be given.

The character of the review work of the eleventh and twelfth weeks will be determined by the instructors in the Department of Gunnery, who will adapt their instruction to the individual needs of the cadets in the subject.

As soon as possible, instruction in synchronizing gears will be introduced in the U. S. Schools of Military Aeronautics. This instruction will occur in the eleventh and twelfth weeks and will partly or wholly take the place of the two weeks review work on the Lewis and Marlin guns.

SYLLABUS FOR COURSE IN AIRPLANES
UNITED STATES SCHOOLS OF MILITARY AERONAUTICS

IV. AIRPLANES 55 Hours.

GENERAL REFERENCES: Signal Corps Training Manual Part I, Aviation Section of the Signal Corps; Training Manual of the Royal Flying Corps, Vol. I; Air Service Handbook (Lt. Col. L.W.B.Rees) in course of publication.

1. Types of Machines

References: Notes on the Identification of Aeroplanes; Silhouettes d'Avions; Brief Technical Descriptions of Various Airplanes (Stencil 876).

The object of this course is (1) to give detailed instruction on a few machines which are to be used by the American Expeditionary Force (see Bulletin No.173 for all Schools); (2) to familiarize the cadets with the general characteristics of French, British and German machines. To aid in accomplishing the latter purpose, part of the second hour should be spent on a test, using silhouette cards of a few of the most important types. (See Bulletins 100 and 110.)

2. Theory of Flight 6 Hours.

References: The Aeroplane Speaks (H. Barber); Aviation (Algernon C. Berriman); Aerial Navigation (Albert Zahm); Learning to Fly in the U. S. Army (E. N. Fales); The Eyes of the Army and Navy (Albert H. Munday); Acquiring Wings (William B. Stout).

More technical, for instructors: First Annual Report of the National Advisory Committee for Aeronautics, pp. 25-110; Second Annual Report of the Foregoing, pp. 13-14, 555-627; Military Aeroplanes and Monoplanes and Biplanes (Grover C. Loening); The Mechanics of the Aeroplane (Capt Duchene, translated by J. H. Ladeboer); The Aeroplane (A.Page); The Design of Aeroplanes (A.W.Judge); Aerodynamics and Aerodonetics (F.W.Lanchester); Course in Aerodynamics and Airplane Design (Alexander Klemin and T. H. Huff, published August 1916 - August 1917 in "Aviation").

Instructors are also advised to familiarize themselves with the following works, which constitute the most accessible printed "sources" of knowledge on the subject:

S. P. Langley, "Experiments in Aerodynamics", Smithsonian Institution, 1891, and "Researches and Experiments in Aerial Navigation", Gov't Printing Office, 1908.

Otto Lilienthal, "Birdflight as the Basis of Aviation", translated by A. W. Isenthal. Longmans Green, 1911.
A. G. Eiffel, "The Resistance of the Air, and Other Experiments conducted at the Champs de Mars Laboratory", translated by Jerome C. Hunsaker. Houghton Mifflin, 1913.
Octave Chanute, "Progress in Flying Machines", M. L. Forney, N.Y., 1908, and "Recent Progress in Aviation", Annual Smithsonian Report, 1910.
Wilbur Wright, "Experiments and Observations in Soaring Flight", 1903.

Clear, untechnical instruction on the cardinal principles and conditions of flight. As has been previously stated, especial emphasis should be laid on the various kinds of stability and the methods used for obtaining them, in order to give the cadet confidence in his machine. Formulae and mathematics will be avoided. Under these restrictions, instructors will follow their own methods in teaching the subject. Below is a list of the chief points to be covered:

1. Primary forces - lift, drift, gravity, thrust.
2. Secondary factors - incidence, camber, stagger, streamline, aspect ratio, etc.
3. Conditions necessary for flight; for speed; for climb.
4. Balancing of forces; gliding angle; flying angles, etc.
5. Lift-drift ratio, and the factors affecting it.
6. Stability; various kinds and how secured.
7. Control.

Nomenclature:

This subject will not be taught separately, as heretofore, but in connection with Rigging and Theory of Flight. For the parts of the airplane a labelled machine should be used. Instructors will make it their object to teach things rather than names, so that mention of a term will bring to the cadet's mind a whole chain of purposes and interrelations and not merely a barren verbal definition. For further guidance on this subject consult Bulletin for all schools, No. 144.

History of Flying:

Instruction on this subject will be limited to one hour and will have as its object the tracing of the development of the airplane of today. The significance of each step may be most clearly explained by some such method as a blackboard sketch of a contemporary machine with the authors of the various features marked on it; e.g., "Camber, Lilienthal"; "Biplane truss, Chanute"; "Stabilizing devices, the Wright Brothers"; "Fuselage, Bleriot and Nieuport". A few minutes may be devoted to the development of balloons.

3. Rigging — 26 hours

References: The Aeroplane Speaks, pp. 90-144; Notes on Rigging for Air Machanics (entire); Manuscript Lecture Notes, S.M.A., (entire); Training Manual Royal Flying Corps, Vol. I; Military Aeroplanes (G.O.Loening), pp. 121-138; Method of Aligning the Curtiss JN4B Stencil 356

PRACTICAL.

Introduction (first week) 2 hours.

Nomenclature and construction of an airplane. Functions of the various parts; of controls. Class gathered round a labelled machine. Brief outline of the content and purpose of Rigging; its importance to pilots. At this time it may be well to give a few general instructions on the use of tools; which to use and not to use for certain purposes; e.g. pliers on turnbuckles. Further instruction on tools to be given when their uses are considered.

Assembly and Alignment

A few hours should be devoted to practice on assembly and disassembly of wings, center section, empennage and landing gear, in order to get the order firmly in mind. When this has been done, practice on alignment may be begin. This should include alignment of the landing gear, fuselage, tail surfaces, center section and control surfaces; setting and checking lateral dihedral, stagger, incidence, wash-in and wash-out; over-all measurements; "wetting". Every cadet should assist in making all these alignments at least once, and if circumstances permit, several times. Especial attention to be given to the alignment of wings and control surfaces.

LECTURES

Alignment 1 hour

Its importance in field work; necessity of pilot being able to detect faulty rigging and correst it. Effects on flight of the most common faults in alignment; why a machine flies one wing low, nose-heavy, tail-heavy, etc.

Materials and Stresses 2 hours

Woods; different varieties used in airplane construction; comparative strength-weight ratios of various woods. Comparision with metals, showing why wood and not metal is chiefly used in airplane construction. Factors affecting the desirability of woods for various parts; grain, seasoning, position in tree. Metals; steel, aluminum, copper. Brief outline of the different kinds of steel; importance of getting the right kind of various purposes. Stresses; tension, compression, torsion, bending, shearing; where found in an airplane. Factors of safety of various members.

Wires and Fittings 1 hour

Kinds of wire; solid wire, aircraft strand, aircraft cord; qualities and uses of each; comparative strength. Streamline wire. Fittings, turnbuckles, locking devices. Brief description of terminal splices (practical work under Care and Repair of Machines); comparative efficienty.

Propellers — 1 hour

Explanation of pitch, pitch angle, slip (As untechnical as possible). Why two-blade propellers are best for light motors, four-blade ones on large motors. Construction and nomenclature. Use of balancing ways and checking table.

Fabric and Dopes — 1 hour

Qualifications of an ideal fabric; of those actually used, linen and cotton. Strength and lightness. Process of covering. Purposes of dope; explanation of nitrate and acetate dopes; methods of application; inflammability. Use of varnish.

The lectures should be distributed through the practical work, in the order above given. The lecture on alignment should serve as an introduction to practical work in that subject. So far as possible, the course will be divided into two-hour periods, in order to avoid interruption of a task before completion.

4. Care and Repair of Machines — 13 hours

References: Training Manual Royal Flying Corps, Vol. I, pp. 10/17; Signal Corps Training Manual Part I, Chap. III; Manuscript Lecture Notes; Inspection Manual, Signal Corps. U. S. A.

Inspection — 2 hours

This part of the course will consist of actual inspection of an airplane, exclusive of the power plant, by the cadet, using the inspection forms. Instructors will explain in detail what constitutes cause for rejection, especially in wires and in the faulty grain of wooden members.

Care of Machines (Lecture) — 1 hours.

Directions for packing and unpacking; loading on trucks, and unloading. Rules for daily care of airplanes and hangars. Methods of inspection; parts subject to daily and weekly inspection.

Patching, Mending and Doping — 3 hours

Actual practice in mending tears and applying patches to fabric. Practice in the application of dope and varnish. If time allows, cadets may cover a small surface such as an aileron or rudder, sewing cloth at open end and around ribs.

Splicing and Soldering — 4 hours

Explanation of how to make French, American running and eye splices; relative efficienty, laboratory work; each cadet will make a loop of some sort. Soldering: advantages and disadvantages; brazing welding, hard and soft soldering processes. Purpose and use of fluxes. Things to be avoided; over-heating, grease, air bubbles, etc. Demonstration of some soldering process, complete, by the instructor, and if possible actual practice by the cadets. If they have made American or running splices, they may complete the job by soldering.

Mending Longerons, etc. 2 hours.

Method of mending a longeron, cutting of joint, glue, bolts, wrapping, varnishing, practical work if possible; if not, demonstration by instructor. How to mend a rib web, a cap strip, how to repair the leading and trailing edge of a wing.

5. Meteorology 3 hours.

References: Meteorology (W. H. Milham); The Principles of Aerography (Alexander McAdie); Holes in the Air (W. J. Humphreys, Gov't Printing Office, 1913); Charts of the Atmosphere for Aeronauts and Aviators (A.L.Rotch and Andrew H. Palmer); Aerial Navigation (Albert Zahm), Part III; The Aviator and the Weather Bureau (F. A. Carpenter); Meteorology and War Flying (R. DeC. Ward) Stencil 552

A brief outline of elementary meteorology, as simple and practical as possible, with the main emphasis on its relation to flying. Matters which are essential to an understanding of the subject but h have no direct bearing on aviation, such as planetary winds or the mercurial barometer, will be explained with the utmost possible brevity. Especial care should be taken to prevent the cadets from receiving false impressions concerning "holes in the air" and kindred phenomena. It should be explained that to the modern high-powered machine those present little danger or even difficulty, and the proper course of action in each event should be given. Following is an outline of the main points to be covered.

1. The importance of meteorological knowledge to aviators. Weather forecasting; action under various conditions.
2. Causes of climate; the sun, the rotation of the earth, the revolution of the earth, consequent distribution of temperatures, pressure areas and winds.
3. Pressure, the keynote of weather. Methods of measuring; relation to cyclonic and anti-cyclonic systems; application to everyday weather.
4. The atmosphere; properties of upper as distinguished from surface air. Temperature and wind gradients. All common phenomena - cascades, fountains, other convectional currents; layers, waves; influence of surface irregularities.
5. Clouds: Kinds, heights, meanings. Thunderstorms.
6. Weather forecasting: Government maps. American, British, French. Untechnical rules of thumb. Interpretation from the ground of conditions at altitudes.

6. Instruments and Compasses 4 hours

References: Signal Corps Training Manual Part I. Chapters VI, VII; Training Manual Royal Flying Corps, Vol. I, pp. 80-100; The Eyes of the Army and Navy (A. H. Munday) Chap. X; General Specifications, pp. 25-28, Second Annual Report, National Advisory Committee for Aeronautics; Stencils 565, 662, Manuscript Lecture Notes.

Purpose and mechanism of the altimeter, barograph, air speed indicator, tachometer, oil and gas pressure gauges, gasoline gauge, drift meter, inclinometer; methods of use, setting. Errors and corrections.

Compass: Gimbal-swung, nautical and aerial types. Explanation of true north and causes of variation and deviation. Lubber line. Deviation card, uses. Examples of converting compass bearing to magnetic bearing and vice versa. Variation, plus or minus, and conversion of true to magnetic bearing, and vice versa. Course setting, with wind allowances. Brief explanation of adjusting compass to deviation in an airplane.

7. Examination 2 hours.

App

SYLLABUS FOR COURSE IN ENGINES IN
UNITED STATES SCHOOLS OF MILITARY AERONAUTICS.

V. ENGINES 59 hours

Introduction.

The course in Engines will occupy 59 hours, of which 11 are given to lectures, 46 are spent in the laboratory, and 2 are reserved for an examination. When possible laboratory periods should be two hours in length to avoid interruption in the performance ofa definite piece of work.

The aim of the theoretical work will be to establish fundamental principles, (1) so that a cadet will understand the parts of his engine in their working relation with especial view to the prevention of trouble, and (2) so that a cadet changing from one motor to another will not be confronted with something wholly new but rather with something familiar in essentials and new only in certain details.

The air of the laboratory work will be first, to give clearer meaning to the lectures since the engine parts referred to are seen and handled and put in relation by the cadets themselves; and second, to give a cadet the technical skill required by practical problems in the field.

General References:

Signal Corps Training Manual Part I. (Aviation Section, Signal Corps)
Airplane Motors - Geo. E. A. Hallett
Aviation Engines - Captain Victor W. Page
Chart for Location of Airplanes Power Plant Troubles - Captain Victor Page
Dyke's Encyclopedia
Mechanical Engineers' Handbook
American Machinist's Handbook

Special References:

Instruction books of various manufacturers.

PRINCIPLES - 9 hours.

I. Engine Action (Stationary Engine) 3 hours.

Power - velocity - R.P.M. - source of power - heat - pressure - transmission of power - piston - connecting rod - wrist pin - crank pin (throw) - crank web - crank shaft - intake and exhoust valves - location of valves.

Four Storike Cycle.
1. Intake stroke - position of valves - suction - charge - intake manifold

2. Compression stroke - position of valves - compression - low compression - piston rings - cast iron - heat - pre-ignition.
3. Power stroke - position of valves - combustion chamber - heat loss - back-kick - misfiring - exhaust valve lead.
4/ Exhaust stroke - position of valves - heat loss - back firing

Valve Timing - (1) meaning; (2) purpose; (3) method; check by (1) crankshaft disc; (2) piston travel.

Multi-cylinder engine - working strokes - smooth torque - arrangement of cylinders (1) vertical; (2) Vee; - firing order.

Cam - cam shaft - cam follower - tappet rod - rocker arm - gears - gaskets - bushings - bearing - bearing clearance - shims - thrust bearings.

II. Carburetion 1 hour

Gasoline - gas - requirements of a good carburetor - principles of single jet carburetor - float feed - Venturi tube - choke valve - throttle - mixing chamber - rich mixture - lean mixture - difficulties in use of single jet carburetor - auxiliary air valve - Zenith carburetor - main jet - compensating jet - priming tube - well - principle of Claudel carburetor.

Effect of altitute on carburetion.

III. Ignition 2 hours

Electricity - voltage - current - resistance - magnetism. Units of electricity - ampere - ohm - volt - watt. Lines of force - conductor - electrical impulse.

Magneto

Rotating armature - alternating current. High tension magneto - primary circuit - primary winding - collector ring - interrupter - short circuit - switch - ground - condenser.
Secondary circuit - secondary winding - induced current - safety gap - distributer - spark plug - electrode - air gap - two spark ignition - timing the magneto (1) meaning; (2) purpose; (3) method. Sequence of firing. Advancing the spark - retarding the spark- when used.

Complete instruction on Berling and Dixie magnetos (or equivalent).
Complete instruction on Delco Battery Ignition.

IV. Lubrication Part of 1 hour.

Importance of lubrication. Oil film - fluid friction. Requirements of lubricant - body, fluidity - conductor of heat, etc. Must not vaporize from heat or coagulate or leave inmurious deposits, etc.

Kinds of lubricant - petroleum - castor oil - carbon deposits.

Pumps (plunger, gear). Gauge - pressure relief valve - filter screen- sump - reclamation.

Systems of lubrication (force feed, full force feed)

V. Cooling — Part of 1 hour

Water cooling - radiator - water jacket - pump (gear, centrifugal) - Thermo-syphon principle. Anti-freezing mixtures.

Air cooling - advantages and disadvantages.

VI. Inspection and Trouble Shooting — 2 hours.

Cause of noisy action - misfiring - overheating - loss of power - failure to start - failure to stop - failure to throttle down - back firing. Logical search for trouble - general troubles - local troubles.

TYPES OF ENGINES - 2 hours

Gnome Monoscupape — 1 hour.

Rotary engines - arrangement of cylinders - crankshaft center - crank pin center - rotation of cylinders - rotation of pistons - transmission of power - length of stroke - odd number of cylinders - firing order - cycle of operations - carburetion - valves and cams - timing of valves and magneto - lubrication - cooling - materials - advantages and disadvantages.

Hispano Suiza — 1 hour.

According to Instruction Book

LABORATORY - 46 hours.

I. Assembly — 16 hours

Assembling and disassembling two motors, with attention to valve timing, clearances, lubrication system, cooling system, materials and specifications of each. Careful alignment of parts. Instruction in tools in connection with their use.

II. Repair — 22 hours

Cooling System - 2 hours.

Soldering cracked water jacket, soldering radiator, testing for leaks, water pump repairs. Repairs of pipes and connections. Have each cadet take pump apart.

Oiling System - 2 hours

Explain setting oil pressure relief valve, removing and cleaning oil filter screen, taking down oil pump, cleaning oil pipes with com-

pressed air, examination of pump for indication of bearing condition, tests of oil; have cadets do all work mentioned.

Carburetion System - 2 hours

Have all cadets take down Zenith carburetor, remove and clean jets, set float level and adjust carburetor on motor. Show cadets how to make good pipe joints, solder leaky tank, etc.

Ignition System - 2 hours

Each cadet should take magneto apart completely, reassemble and test. Each cadet should be given instruction on cleaning and adjusting spark plugs, making wire teminals, adjusting magneto breaker points, cleaning distributor, replacing brushes, etc.

Cylinders - 2 hours

Each cadet should be made to clean carbon out of combustion chamber, solder water jacket on Curtiss engine, clean and ream valve seats and show how to detect worn or scored cylinders, worn guides, etc.

Valves - 2 hours

Cadets should be taught how to remove valves, clean off stems, examine for shoulders, warped heads, scored or pitted seats. Each cadet should grind in two valves to good seating and test seating with prussian blue. Importance of using proper abrasive and grinding pressure should be emphasized.

Pistons - 2 hours

Each cadet should be made to clean off carbon and polish pistons with mineral wood in and out after rings are removed. Outline importance of cleaning spacew back of rings, having proper elasticity to rings and not too much side play in grooves. Show method of removing and installing rings without breaking. Have cadet fit oversized ring to groove. Explain necessary gap at ring for expansion.

Bearings - 6 hours.

Connecting Rod Bearings - Explain to each cadet how bearing linings wear in service. Have each cadet remove worn lining and replace with new brasses. Show method of lining with reamer and fixture, and method of fitting by scraping. Show tests for bearing parallelism and proper bearing.

Main Bearing Fitting - Show cadet how bearings are aligned with line reamer and fitted with hand scraping process.

Work by cadets on connecting rod bearing scraping. Show how to test with blue, sharpen scraper on oil stone and emphasize care to be taken. Each cadet should have an opportunity to handle bearing scraper.

Work by cadets in fitting crankcase main bearings by hand scraping and alignment bar. Use discarded crankcase and straight shaft.

Crankshaft - 2 hours

Each cadet should be taught how to swing crankshaft in lathe and test for truth and roundness of crankpins and main journals with dial indicator. Roughened bearings should be smoothed down with lap or emery paper and oil. All points on crankshaft needing inspection should be pointed out.

III. Trouble Shooting 8 hours

Cadets must be able to locate and correct faults in carburetion and ignition systems of motor on test block, set oil pressure relief valve, find cause of overheating, etc.

A motor should be assembled with various faults such as one piston without rings, loose bearing, poor valves in one cylinder, imperfect valve timing, loose pins in rocker arms, etc., and installed on test stand. Cadets should be made to find and correct troubles and have engine running quietly, smoothly and at proper number of R. P. M. with standard propeller or brake installed.

Examination 2 hours.

SYLLABUS FOR COURSE IN
OBSERVATION IN
UNITED STATES SCHOOLS OF MILITARY AERONAUTICS

VI. OBSERVATION 39 Hours.

1. Map Reading 16 hours.

References: Military Map Reading (Capt. C. O. Sherrill); Notes on Training Field Artillery Details (Danford & Moretti) pp. 1-20; Instructions Concerning Battle Maps - Annexes (W.D.Document No. 598) pp. 42-43; Maps and Artillery Boards (W.D. Document No.587)

The aim of this course is to bive the cadet such map knowledge as will enable him to visualize the area represented with reference both to the relief and to the natural and artificial features upon the surface, to the end that he may be able, first, to find his way about over the territory, and second, to locate and describe points of military importance. It is of primary importance that an aviator should not get lost. This point is so obvious that it is apt to be neglected but it should be kept in mind continually throughout the course. Since little sketching is required of an aviator, practice in map sketching will be given only for the purpose of assisting the student in map interpretation. The main part of the work in pinpointing is to be done on the Artillery Observation Range. The practice on the rotary map is intended to correct for the confusing effect of the rotary motion experienced in turning about with the airplane at great heights. As to accuracy required, see suggestions under Artillery Observation Range and make proper allowances for difference in scale.

One hour is to be devoted to each of the following paragraphs:

I. Importance of map knowledge to a military aviator, kinds of maps used in military operations, conventional signs and abbreviations, meaning of scales and method of representation, scales of French and English maps, problems in reading ground distances in metric units by use of scales. (The meter and kilometer must become familiar units of measure. The meter stick should be handled by the students. One hundred meters, then one kilometer should be measured off on a straight road or street familiar to the students in order to fix these values in their minds. Practice in estimating distances should be given when out of doors.)

II. Contours, vertical or contour interval (V.I.), map distance (M.D.) guides in making and reading contour maps, profiles, exercise in sketching contours with reference to hills, valleys, saddles, cliffs, gentle and rugged slopes, etc. Review conventional signs and abbreviations, Review scales.

III. Orientation: definition, orientation by stars, by watch, by known points, and by compass; true north and magnetic north, azimuth,

problems on variation and deviation. Finding one's position on the map; resection; intersection. Sketching equipment.

IV. French and English systems of squaring maps explained. Pinpointing demonstrated and practiced on hand maps.

V. Problems on scales, converting French scales into English and vice versa; determining scale from points of known distance; converting R.F. into scale of inches per mile or miles per inch, etc.

VI. Problems in plotting courses having given distances and bearings, and problems in finding distances and bearings having the course defined by points to be covered.

VII & VIII Photographis interpretation. Lectures with slides.

IX. Pin pointing on rotary map.

X. Designate two points on floor map, then by use of hand map calculate distance and true or magnetic bearing. Dischances should be computed in metric units.

XI. Give the cadet the bearing and length of a course starting from a given point on the floor map. Require the finishing point of the flight.

XII. Plot a course covering three, four, or five points marked on floor map. Require the cadets to compute distances and bearings of each part of course.

XIII. The airplane is assumed to be flying along a course designated on the floor map. At a certain point along the course it is decided the pilot will turn towards the airdrome. Require how many degrees the machine will turn to flyin new direction and distance to airdrome from point of turning.

XIV to XVI inc. Working scales and sketching out of doors. The out-door sketching may precede the work on the rotary map at the discretion of the instructor.

2. Cooperation with Artillery 5 hours.

References for Cooperation with Artillery and Artillery Observation Range; Field Artillery Notes No. 1; Instructions for the Employment of Aerial Observation in Liaison with Artillery (Stencil 294; identtial with Chapter VOO of the foregoing;) Notes on Training Field Artillery Details (Danford and Moretti); Duties of the Air Service (Stencil 827); French Artillery Observation (Stencil 841); Artillery Notes for Observers (Stencil 765); French Artillery and Air Organization (Stencil 828); Instructional Notes No. 20; Use of Artillery in Battle (Stencil 895); Specimen Shoot, Instructional Notes No. 25; French Artillery zone and battle maps.

App

I. Types of Artillery. Field guns, light howitzers; long range guns, heavy howitzers, trench mortars; calibres and uses of each type. (Stencil 765, Instructional Notes No. 20). Types of ammunition; high explosive, sharpnel and high explosive sharpnel. Types of burst, graze, etc., Barrage, counter battery, siege.

II. Organization of French artillery; allottment of front. Organization of Flying Corps (French Artillery and Air Organization, French Artillery Observation, artillery zone maps, 1:50000).

III. Methods of Fire. (F.A. Notes No. 1, Chap III.) Fire for adjustment, fire for effect; destruction, neutralization. Prearranged and impromptu shoots, zone maps. (French Artillery Observation).

IV. Methods of Fire, continued. Explanation of range, deflection, bracket, salvo, bracketing salvo, center of impact, causes of error, sheaf of fire, 50% zone, 100% zone, time of flight. Reporting of observation. (Signal Cards).

V. Procedure of a shoot. (French Artillery Observation). What to do before, during and after a shoot, reports. Outline of different methods of procedure in cooperation with heavy and light artillery.

3. Artillery Observation Range 16 hours

I. Explanation of range and French Kilometer gird. Use of coordinates1 hour

II. Preliminary practice in pin pointing, oral or written; all the class observing 1 hour

III, Reporting of points (bursts) by buzzer. Half class may act as observers and half as wireless officers, the latter receiving the reports of the former, writing them down and handing them in to the instructor. Class changes places every half hour. If this is impossible, some other arrangement may be made, with the purpose always in view of giving every man the longest possible time at the key 2 hours

IV. Explanation of French system of corrections with reference to the battery-targer line. Rough methods of judging distances on the range. Practice with single shots in reference to a target; same system as before, single bursts. 2 hours

V. Conduct of prearranged and impromptu shoots, with ground strips. (There is in the French system no "Zone Call" in the English sence, as the observer takes up with him a map showing districts covered by light and heavy batteries, with approximate position of the latter) All firing by single bursts 2 hours

VI, Further practice in procedure, with single shots 2 hours.

VII. Explanation of salvo fire; speed of shots, time of flight; system of judging with reference to the <u>right</u> gun of the hostile battery; deflection error taken from right hand burst of salvo, range from mean point of impact. Practice in shoots, as before 2 hours

VIII. Further practice in salvo fire. Review 2 hours

IX. Examination (To be given in twelfth week).
5 pin-point, 5 corrections in the BT line, single shots by buzzer.
Part of a prearranged shoot (single shots mainly or wholly with ground strops; at least 5 corrections. 2 hours

X. System of grading. The final makr on the whole course will be computed as follows:
50% on written examination, covering Map Reading and Cooperation with Artillery.
50% on artillery observation range work
The mark on range work will be computed as follows:
50% on examination
50% on class work, based on grades for three short tests of recitations, by buzzer, of a minimum of five pin-points or corrections each.
The passing mark will be 60. Allowable margin of error, 5 centimeters (2 inches) on the range, or 50 meters on the ground, in both directions. (It is assumed that the range is on a scale of 1:1000 and that the observer's gallery is approximately 15 feet above it; margin may be altered at discretion of instructor to meet other conditions.)

Any class work given in the courses covered by the written examination will not be included in the final grade.

(Note. The above apportionment of time to subject matter will be followed as closely as possible, but instructors are at liberty to alter details of instruction to suit the exigences of the ranges. As will be seen from the material sent out, the work of this course does not cover the whole ground. The instruction will be continued at the Flying Schools.)

Examination in Map Reading and Cooperation with Artillery 2 hours.

App.

OUTLINE FOR SUPERVISED RECREATION AND ORGANIZED SPORTS
UNITED STATES SCHOOLS OF MILITARY AERONAUTICS

VII. SUPERVISED RECREATION AND ORGANIZED SPORTS 5 hours a week

Time for recreation is provided in the afternoon, early or late, according to season. It will include the following:

1. Inter-squadron contests in football, baseball, soccer, basketball, track athletics or hookey, according to season.

2. Informal sports: track athletics, gymnastics, tennis, boxking, wrestling, fencing, rowing, swimming, etc., according to season and facilities.

3. Trap shooting, or target practice with the Army rifle or pistol.

The object is to provide:

(a) Recreation from more formal duties.

(b) Physical fitness.

(c) A more lively sense of esprit de corps.

For the last-named reason, as may cadets as possible should be encouraged to take part in inter-squadron sports. The Schools will furnish the necessary athletic equipment and the Commandant will appoint an athletic director, or committee, to make the necessary arrangements. The cadets themselves may be consulted on details. Championship series may be organized and thropies offered to the winning teams with the object of inspiring the greatest possible interest. Due precaution, however, should be taken against diverting the cadets chief attention from their studies. It should also be made plain to them that the time devoted to recretion is a part of the curriculum, and is included in it for the purpose of making them better and healthier officers.

Cadets may, if they choose, be allowed to participate in less formal sports, in which tournaments or team contests may be arranged. Trap shooting and target practice should be freely developed.

By direction of the Chief Signal Officer:

Geo. A. Washington,
Captain, Signal Corps.
O.I.C. Schools Branch, Training Section.

(Copy)

Air Division
Schools Section
Third Floor
635 F St. N.W.

Moulthrop-C

WAR DEPARTMENT
OFFICE OF THE CHIEF SIGNAL OFFICER
WASHINGTON

February 28, 1918.

MEMORANDUM No. 236 for all Schools:

1. The curriculum for the enlarged course of twelve weeks at the Schools of Military Aeronautics, together with the syllabi of the various courses is being sent you herewith.

2. The keynote of the longer course is to be the inculcation of discipline and a proper military ideal in the Flying Cadets. This is to be the dominating aim throughout the Ground School training. While the cadet is at the Ground School he should be thoroughly impressed with the fact that he is only an enlisted man and he should receive the training on that basis. As far as possible he will wear the regulation enlisted man's uniform except as modified by regulations or orders and he will not assume the privileges of an officer such as receiving salutes as has occurred in some instances. At the same time his instruction should fit him for his subsequent status as an officer. The aim is not only to teach him the technical matters which an officer should know in order to perform his duties, but also the little amenities to be expected from an officer and a gentleman. For example, such matters as mess etiquette should be insisted upon in order that our young officers when they go "overseas" will not be subject to criticism in such matters as has been the case in some instances already.

3. In the enlarged course the desire is not so much to increase quantitatively the subjects taught as to insure a greater thoroughness in matters already being given. This is to be particularly so in such subjects as Army Paper Work in which there should be given a great deal of practical drill in the use of blank forms. Large numbers of these should be freely used and as it will be necessary for the schools to furnish most of them, it is suggested that large quantities be printed or mimeographed on cheap paper which undoubtedly can be done at small expense. The cadet should be prepared for all sorts of possible contingencies which may arise after he receives his commission such as being called upon unexpectedly to take charge of a detachment of men and conduct them to some post, possibly abroad or to be a member of a court martial.

4. The subject of supervised recreation and sports is to be taken as a subject of instruction in the same spirit as any of the other subjects included in the curriculum. It is not to be treated as merely a recess period for the men but one in which they are to work as earnestly and conscientiously as in any other. In order to obtain this result the Commandants and faculty will have to give the subject very careful consideration and supervision in the actual working out. Large amount of additional equipment will be necessary for this work and this the schools will be

...ir Division
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615 W 51st St., N...

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War Department
...

February 26, 1918.

MEMORANDUM No. 206 for all schools:

3. The remarks of the lecturer course is to be the ...
...

5. The keynote of the longer course is to be the ...
should be thoroughly impressed with the fact that he is only an enlisted man and be
...ng on that basis. As far as possible he will ...
occurred in some instance. At the same time his instruction should fit him for his
subsequent status as an officer. Use will be not only to teach him the technical
matters which an officer should know in order to perform his duties, but also the
little amenities to be observed from an officer and a gentleman. For example, such
matters as mess etiquette should be insisted upon in order that our young officers
...the case in some instances already.

6. In the subjects covered the course is not so much to increase ...
being given. This is to be particularly so in such subjects as Army ...
...
cadet should be prepared for all sorts of possible contingencies which may arise
...
be a member of a court martial.

9. The subject of courtesy should be carefully ...
the curriculum. It is not to be treated as merely a recess period for the ...
...
...equipment will be necessary for this ...

called upon to furnish. Trap shooting is included and this, of course, is to be taken by all men in the minimum amount now being given and in such additional amount as equipment and facilities will permit. It is of great importance for the men to be very carefully supervised and properly instructed in learning to shoot. Wrong habits acquired at the beginning will completely destroy the value of this course to the men and prove positively harmful. The Commandants are directed to advise this office very fully of what is done in this subject of supervised recreation and to freely submit suggestions and criticisms. The object of this division of the curriculum is not only to build up the men physically but to make him a good sportsman in the highest sense of that term and to build up such an esprit d'corps that the cadet will feel that he is a member of the best squadron, of the best school, of the best branch, of the best army, of the best country in the world.

5. Additional instruction in subjects such as Engines and Rigging is aimed to bring about a greater thoroughness in practical work in those departments.

6. The new curriculum will be inaugurated at all schools with the classes entering March 11th. It is desired that a class be graduated from the school every week and it is therefore directed that the last class entering under the old schedule namely that of March 4th, be divided toward the end of its course into thirds on the basis of scholastic standing, so that the highest third will graduate at the end of eight weeks, the next third at the end of nine and the remainder at the end of ten weeks. The first class taking up the new curriculum, namely, that entering March 11th, will be divided in like manner, the first third to graduate at the end of ten weeks, the second third at the end of eleven and the remainder at the end of twelve weeks. The schedule of the division of the work for these broken classes will be forwarded the schools in ample time to insure instruction under the modified curricula.

The existing contracts with the Universities will be modified to the extent of omitting the $65.00 maximum limit for tuition. The Universities will receive tuition for each man at the schools for each week he is actually under instruction at the rate as heretofore, $10.00 for the first four weeks and $5.00 for each week thereafter. As the schools will probably be filled to capacity by the enlarged course there is little danger of the Universities losing financially and they can safely be encouraged to improve barracks facilities and matters of equipment.

8. The Ground Schools have taken on an added importance and this cannot be too strongly impressed upon both officers, instructors, and men under instruction.

By direction of the Chief Signal Officer.

J. R. Moulthrop

Major, Signal Corps.

A true copy
(Signed) J.M. Van Dyke
Lst. Lieut., Sig. R.C., A.S.

Appendix No. F5.

C.W.Cobb:H

Air Division
Training Section
Schools Branch

WAR DEPARTMENT
Office of the Chief Signal Officer
Washington

April 4, 1918

MEMORANDUM NO. 297 FOR ALL SCHOOLS:

1. In accordance with instructions received from the Chief of the Training Section on March 15th, the following subjects then given in the Flying Schools-Military Subjects 71 hours, Airplanes 36 hours, Engines 29 hours, Artillery Observation Range 16 hours, Total 152 hours, are to be taken over as far as possible by the Ground Schools "leaving to the Flying Schools only practical work with such necessary periodic qualification tests as will insure the cadet's proficiency".

2. In order to comply with these instructions as fully as may be done in a twelve weeks' course, the attached curriculum was made out and will be put into effect by the Schools of Military Aeronautics with the squadrons entering on April 15th, 1918.

3. It will be noted that compared with the curriculum of November 1st, Military Subjects have been increased by 75 hours, subjects now grouped under Airplanes by 21 hours, Engines by 20 hours and Map Reading and Artillery Observation Range by 12 hours, making a total of 128 hours' increase.

4. The course given at the Flying Schools in Airplanes and Engines was as follows, by subjects:

AIRPLANES

(1) Wood and Wood Working		
	Lectures	3
	Shop Work	2
(2) Repairing Airplane Parts		
	Lectures	3
	Shop Work	3
(3) Propellers, Checking and Testing		
	Lectures	1/2
	Shop Work	1/2
(4) Fabrics and Sewing		
	Lecture	1
	Shop Work	2

(5) Dopes and Doping
Lecture 1
Shop 2

(6) Air Plane Assembly and Repair
Lectures 6
Shop Work 12 Total 36 hours

ENGINES
(1) Air Plane Motors - Repair and Operation
Lectures 7
Shop Work 20

(2) Organization and Operation of Engr. Dept.
Lectures 2 Total 29 hours

In order to take over most of this work, it was necessary to increase the time given to laboratory work in Airplanes in the curriculum of March 1st by 8 hours and the time given to Engines by 4 hours, giving to the course in Airplanes a total of 88 hours, and the course in Engines a total of 89 hours. It is also thought advisable for the sake of more thorough instruction to limit the size of the laboratory classes so that not more than six men shall be working on one engine nor more than ten men on one airplane at the same time.

5. To allow for the increase in Airplanes and Engines, the courses in Pursuit, Bombing, Cooperation with Infantry, Reconnaissance and Photography have been omitted. General lectures on these subjects may be given from time to time at the discretion of the Commandant for the purpose of interesting the cadets in their work and showing the scope of the air service, care being taken that the regular work of the curriculum is not interrupted. The lectures should be given preferably by men who have been at the front if such men are available from time to time, but if such men are not available, they may be given by school instructors. In any case, cadets must be cautioned that procedure at the front is constantly changing and that they must beware of getting fixed ideas with regard to this procedure.

6. After advising with the Commandants of the different Ground Schools concerning recreation and organized sports, the time devoted to this subject has been changed from two hours daily to five hours a week, to be distributed at the discretion of the Commandant.

By direction of the Chief Signal Officer.

Geo. A. Washington,
Captain, Signal Corps
O.I.C. Schools Branch, Training Section

Attach - 1 set of papers
A true copy:
(Signed) J. A. VanDyke
First Lieut, Sig. R.C., A.S.

(c) Thesis and Reports

APPENDIX F6

Contains the following:

Curriculum of October 14, 1918 (Stencil No.272) - (32 pages)
Bulletin No. 348 (Stencil No. 292) - (2 pages)

WAR DEPARTMENT
Office of the Director of Military Aeronautics
Washington.
Training Section, Ground Schools.

CURRICULUM NO. 26 U. S. BUREAU OF MILITARY AERONAUTICS
Course for Pilots
Revised October 14, 1918.

SUBJECT	T	T	2	3	4	5	6	7	8	9	10	11	12	T
I. MILITARY SUBJECTS														
Drills	152	29	10	10	10	10	10	10	10	10	10	8	5	
Theoretical	29	5	11	5		5	3							
Examinations	3			(2)			(1)							
Gas Defense	8					4	4							
Examinations	1						(1)							173
II. SIGNALLING														
Practical	25	5	10	5			3	2						
Radio Apparatus	2										2			
Examination	2			(1)							(1)			29
III. GUNNERY														
Machine Guns	50								10	7½	7½	12½	12½	
Traps	10									2½	2½	2½	2½	
Examination	2												(2)	82
IV. AIRCRAFT														
Principles, Theory of Flight	6			4	2									
Rigging	28			4	6	6	6	3						
Repair	11				3	4		4						
Instruments	2			2										
Types	2				2									
Penguins	12											6	6	
Examination	3				(1)			(2)						61
V. ENGINES														
Principles	12				4	4	4							
Types	4							2	2					
Shop work	32				5	6	6	5	7	3				
Engines Running	18									8	10			
Examination	3				(1)					(2)				69
VI. OBSERVATION														
Maps	18		8	6	4									
Examination	1				(1)			10						
Navigation	15							10	5					
Meteorology	2								2					
Examination in Nav. & Meteo.	1								(1)					
Coop. Artl'l.-Lectures	5									4	1			
Range	4										4			
Photo. Interpretation	18											10	8	
Examination	2												(2)	66
		39	39	39		39	39	38	38	37	37	38	39	38	460

VII. Supervised Recreation and Sports - Three and one-half (3½) hours Wednesday afternoons - Contests, football, soccer, basketball, track, etc.,-Two (2) hours Saturday mornings, boxing, wrestling, gymnastics and bayonet fencing.

VIII. Saturday afternoons and evenings and Sundays, until 7:00 P.M., release from quarters.

*Twenty (20) minutes Calisthenics immediately after reveille, daily except Saturdays, Sundays and holidays.
Mondays, Tuesdays, Thursdays, and Fridays, Escort to Colors, Parade, Review or Formal Guard Mount.
Saturday mornings, - Formal Inspection preceded by Review.

(Stencil No. 272)

WAR DEPARTMENT
Office of the Director of Military Aeronautics
Washington.
Training Section, Ground Schools.

CURRICULUM FOR U. S. SCHOOLS OF MILITARY AERONAUTICS
Course for Bombers
Revised October 14, 1918.

SUBJECT	T	1	2	3	4	5	6	7	8	Totals
I. MILITARY SUBJECTS										
Drills*	99	29	10	10	10	10	10	10	10	
Theoretical	29	5	11	5		5	3			
Examination	3			(2)			(1)			
Gas Defense	8					4	4			
Examination	1						(1)			140
II. SIGNALLING										
Practical	30	5	10	5		5		5		
Radio-Apparatus	2								2	
Examination	2			(1)					(1)	34
III. GUNNERY										
Machine Guns	30					5	10	7½	7½	
Traps	5							2½	2½	
Examination	2								2	37
IV. AIRPLANES										
Principles	6			4	2					
Rigging	10			4	6					
Repair	3				3					
Instruments	2			2						
Types	2				2					
Examination	1				(1)					24
V. ENGINES										
Principles	4				4					
Shop Work	5				5					
Examination	1				(1)					10
VI. OBSERVATION										
Maps	18		8	6	4					
Examination	1				(1)					
Navigation	15					10	5			
Examination	1						(1)			
Photo, Interpretation	18							10	8	
Examination	2								(2)	
Bombing	9						5	4	2	
Examination	1								(1)	61
		39	39	39	39	39	38	39	38	310

VII. Supervised recreation and sports - three and one-half (3½) hours ea. afternoons - Contests, football, soccer, basketball, baseball, track, etc.,-2 o (2) hours Saturday mornings, boxing, wrestling, gymnastics and bayonet fencing.

VIII. Saturday afternoons and mornings and Sundays, until 7:00 P.M., release from quarters.
Twenty (20) minutes Calisthenics immediately after reveille, daily except Saturdays, Sundays, and holidays.
Mondays, Tuesdays, Thursdays, and Fridays,-Escort to Colors, Parade, Review or Formal Guard Mount.
Saturday mornings, - Formal Inspection preceded by Review.

(Memo No. 2125.)

WAR DEPARTMENT
Office of the Director of Military Aeronautics
Washington.
Training Section, Ground Schools Branch.

CURRICULUM FOR U. S. SCHOOLS OF MILITARY AERONAUTICS.
Course for Observers, Corps d'Armee.
Revised October 14, 1918.

SUBJECT	T	1	2	3	4	5	6	7	8	9	T
I. MILITARY SUBJECTS											
Drills*	109	29	10	10	10	10	10	10	10	10	
Theoretical	29	5	11	5		5	3				
Examination	3			(2)			(1)				
Our Defense	8					4	4				190
Examination	1						(1)				
II. SIGNALLING											
Practical	30	5	10	5		5		5			
Radio-Apparatus	2									2	
Examination	2			(1)						(1)	34
III. GUNNERY											
Machine Guns	30					5	10	7½	7½		
Traps	10							2½	2½	5	
Examination	2								(2)		42
IV AIRPLANES											
Principles	6			4	2						
Rigging	10			4	6						
Repair	3				3						
Instruments	2			2							
Types	2				2						
Examination	1				(1)						24
V. ENGINES											
Principles	4				4						
Shop Work	5				5						
Examination	1				(1)						10
VI. OBSERVATION											
Maps	18		8	6	4						
Examination	1				(1)						
Navigation	15					10	5				
Examination	1						(1)				
Coop.Art'l.-Lectures	5						4	1			
-Range	4							4			
Examination	1							(1)			
Photo.Interpretation	38									17	
Examination	&									(2)	
		39	39	39	39	39	39	37	37	37	345

VII. Supervised recreation and sports - three and one-half (3½) hours Wednesday afternoons-Contests football, soccer, basketball, baseball, track, etc.,-Two (2) hours Saturday mornings, boxing, wrestling, gymnastics and bayonet fencing.

VIII. Saturday afternoons and evenings and Sundays, until 7:00 P. M., unless from quarters.

*Twenty (20) minutes Calisthenics immediately after reveille, daily except Saturdays, Sundays and holidays.
Mondays, Tuesdays, Thursdays, and Fridays,-Escort to Colors, Parade, Review or Formal Guard Mount.
Saturday mornings, - Formal Inspection preceded by Review.

NOTE.

The curriculum herein contained is to be adhered to literally in the following respects.

1. Time allotted to each subject.
2. Division of time by weeks.
3. Subject matter.

It is believed that the details of the curriculum as outlined present a successful solution of the teaching administration of the various subjects, both as to analysis, and as to the order in which the subdivision of the subjects are introduced, and that the assignment of time to the subdivision is reasonable and practicable. It is realized, however, that discretion must be allowed to the individual instructors, under the supervision of the heads of departments, to revise the curriculum as here suggested so far as these details are concerned, if in their opinion such revision is required to obtain the best results in teaching.

The field of military aeronautics is developing so fast that it is not easy for any individual or institution to keep abreast of it. The instructional staffs of the schools must therefore make every effort, by means of the bulletins sent out by the Ground Schools Branch, by reading the latest publications, by conversation with practical aviators at every opportunity, to keep their knowledge up to date. If at any time they thus obtain new material for their courses it will be to the advantage of all concerned. No serious change in any course must be made, however, without authority from the Training Section, Ground Schools Branch.

OUTLINE FOR COURSE IN MILITARY SUBJECTS IN UNITED STATES

SCHOOLS OF MILITARY AERONAUTICS
evised October 14, 1918.

I. MILITARY SUBJECTS. 140-173 hours.

1. Practical Course 99-132 hours

a. Daily infantry drill, including the schools of the Soldier, Squad, and Company, Ceremonies and Guard Duty.

While the purpose of this drill is primarily disciplinary, every cadet should be given sufficient training to enable him to take command of a small body of troops or to participate in ceremonial formations. To this end every cadet should be given frequent opportunity to command a squadron at drill and his performance should be carefully noted and marked by a competent officer. All cadets should be taught the Manual of Arms. One half an hour on Mondays, Tuesdays, Thursdays, and Fridays should be devoted to ceremonies, such as Parade, Review, Retreat and Formal Guard Mount. On Saturday mornings there will be Formal Inspection, preceded by Review. Cadets should be thoroughly instructed in Interior Guard Duty; each cadet should perform actual guard duty several times during his course. The hours allotted to drill are intended to include the time necessary for instruction in Infantry Drill Regulations and Interior Guard Duty by the Tactical officers.

b. Physical Training.

A twenty minute period should be devoted immediately after reveille, daily except Saturdays, Sundays and Holidays, to Calisthenics. This exercise should be most carefully supervised, as it is to be regarded, aside from the physical exercise which it affords, as an important disciplinary exercise. The conduct of this work should not be left to the student officers; it should be carried on by an officer or a non-commissioned officer.

c. First Aid.

Not more than three hours should be devoted to demonstration and drill in first aid measures under the supervision of the Medical officer and in accordance with lectures given on the subject.

Throughout the work outlined above, the work of the individual cadets is to be carefully noted with respect to their spirit and efficiency.

2. Theoretical Course - Lectures 29 hours
(For references see Stencil No. 157)

a: Discipline, Military Courtesy, Ideals of the Service.
1 hour

Every effort should be made to make this lecture inspiring and impressive. It should be the first lecture of the course and, when possible, should be given by the Commandant. It is of the utmost importance that the

vital necessity of discipline should be impressed upon the cadet at the beginning of his course. The intimate relation between military courtesy and discipline should be stressed. It should also be made very clear to the cadets that they are expected to become flying officers and not mere aerial chauffeurs. It cannot be too strongly impressed upon the cadets that they must conform to the standards of "an officer and a gentleman".

b. Hygiene and Sanitation. 3 hours.

This course should include: (1) Personal Hygiene; (2) First Aid: (3) Sanitation in Barracks and Camps. These lectures will be given in the fifth or sixth week.

c. Organization of the United States Army. 1 hour

This lecture should be a general survey of the administrative organization of the army, including the relations of the President, Secretary of War, and Chief of Staff, and the functions of the various staff corps and departments. The general administrative organization of the Air Service should be especially emphasized. No attempt should be made to teach details.

d. Methods of Modern Warfare. 7 hours.

An outline should be given of the methods used by the armies of today on the European battle fronts, covering modes of attack and defense, including trench warfare. The special point to be brought out is the place of the airplane in modern military operations. The various types of air service -- scout, observation, artillery co-operation, infantry co-operation, bombing, combat and independent -- should be described in connection with these various operations. It will be noted that the time given to this subject has been increased from four to seven hours and the course should be made correspondingly more serious. These lectures will be given before the two-hour examination.

e. Army Regulations and Paper Work. 12 hours.

The aim of this instruction should not be to compel the cadet to memorize detailed points in "Army Regulations" or the details of Army Paper Work. The instructor should not follow the text of "Army Regulations" but should cover the topics as such, pointing out where the regulations are to be found. Matters covered in "Special Regulations" or "General Orders" should not be slighted. At the end of the course the cadet should have mastered the fundamental rules as to authorities, procedure, pay and allowances, etc., in the army, and know where to look for the rest. The subjects of rank and grade and uniform and insignia may well be taken up first. These should be followed by regulations primarily affecting enlisted men, such as promotions, transfer, furloughs, discharges, desertion, pay and allowances and compulsory allotments. Then should come regulations affecting officers, such as commissions, promotions, transfers, leaves of absence, travel, pay and allowances, resignation and dismissal. Accountability and responsibility should be explained thoroughly. Essential points in squadron administration, such as squadron funds and mess funds, should also be taken up.

In the study of paper work only the most essential forms, such as are used daily or frequently in connection with squadron administration, should be discussed. The following should be covered: Service Record, Individual Equipment Record, Morning Report, Sick Report, Duty Roster, Ration Return, Discharge Certificates, Final Statement, Delinquency Record, Memorandum Receipt, Report of Survey and Statement of Charges. It is not intended that there shall be any hard and fast line drawn between hours devoted to Army Regulations and those devoted to Paper Work. The best results can be obtained by merging the treatment of the two at times. It is expected that printed forms shall be distributed among the cadets to be filled in by them, and that these forms shall be corrected and given back to the cadets. Each cadet should have a copy of the Engineer Training Manual, Appendix No. 2, in his possession throughout the course in Paper Work. As much time as possible should be devoted to the subject of Military Correspondence. The cadet should be required to write at least two letters, with indorsements; these should be corrected and returned.

Examination 2 hours.

A two-period written examination will be given at the end of the third week, following 21 hours of instruction. This examination will be final on the subjects covered in the first three weeks.

f. Military Law. 4 hours.

This course should cover the essentials of Military Law, including types of jurisdiction and tribunals, persons subject to military law, relations between civil and military courts, reciprocal rights and duties of officers and enlisted men, preferring of charges, appointment and jurisdiction of courts-martial and court procedure, with especial reference to the rights of the accused. The Manual of Courts-Martial should be brought to attention as a reference book only. The expenditure of a relatively large proportion of the time on general court-martial procedure should be avoided.

g. Morale and Esprit de Corps. 1 hour.

This lecture, like the first, should be delivered by the Commandant. It should come near the end of the course and should emphasize the importance of the Air Service in itself, and of high ideals and morale in this Service. The cadets should draw from it an inspiration which they will carry with them to their own great good and the good of the Service into flying field, camp, and actual service at the front.

Examination 1 hour

This examination will be final on the subjects covered in the fifth and sixth weeks.

3. Gas Defense

a. Lectures. 3 hours

The time allotted to this subject has not been changed, and the work will be governed by Stencil No. 157 and subsequent Bulletins.

(Stencil No. 272.)

OUTLINE FOR COURSE II SIGNALLING

IN

UNITED STATES SCHOOL OF MILITARY AERONAUTICS.
Revised Oct. 14, 1918.

II. SIGNALLING

1. The course in Practical Signalling will vary in length for pilots, bombers, and observers, as indicated on pages 1-3. Practical Signalling will be on buzzer work, occupying 28 hours for pilots, 30 for bombers, and 30 for observers, with two hours Lamp Signalling and two hours Panneau work included. In addition two lectures on the use of Radio apparatus are to be given, and a further two hours allotted to the examination in each case. No field work is required and no lectures on the theory of Radio.

2. The whole aim of the teaching should concentrate on the practical training necessary for efficient signalling from an airplane; every phase of telegraphy not essential for pilots or observers should be strictly eliminated. (For type of signals used see Stencil #294, pp. 22-25, 31-32.

3. The emphasis of the course must be upon accuracy rather than upon speed, since for airplane signalling a moderate speed is quite sufficient but accuracy is absolutely necessary, not only as regards the letters and figures, but also the spacing of groups. In other words, the desire is to find the highest speed at which cadets can send, meeting the requirements as to accuracy and quality. Accuracy will be determined according to the methods of testing laid down in Form 60.

4. The necessary requirements for graduation will be to send 6 words per minute on the buzzer and to receive 6 words per minute. In all cases, the expression "words per minute" will mean code words of five letters sent with an accuracy of ninety-five per cent (95%) or better. Although the graduation requirement will be as stated above it is advisable at times, during the twelve weeks' course, to increase the practice speed to 10 or 12 words per minute. In order to keep the men alert and to give them a standard by which to judge their development, the speed may be increased and decreased for short periods, jumping from 6 words per minute to 8 or 10 for part of an hour, and then returning to a lower speed.

5. It is important that at first the instruction should be entirely from the sound and not the sight of the code. Nothing printed or written should be used until the cadet is fairly familiar with the sound groups. It is a training of the ear that is desired.

6. Later in the course work with the silenced key should be stressed for the sake of training the touch independent of the ear. In signalling from an airplane the pilot has to rely on touch altogether.

b. Practical Drill. 5 hours.

The time allotted to drill in Gas Defense will not be taken from the time allotted to Infantry Drill as has been heretofore the practice; this subject will come in the fifth and sixth weeks of the course as provided in this curriculum.

Examination 1 hour

A special, practical examination in Gas Defense.

7. Outline of work:

a: Morse code taught by ear. Alphabet, including "ch" (- - - -), numerals, symbols, for "break" (-...-), for correction (.....), and for end of message (.-.-.). No other symbols needed. Common mistakes in forming letters. Spacing of words. Proper method of holding key, position of arm and wrist. (See Council 584, "Ground School Training Notes No. 7"; also Bulletin 198).

b. Practice in sending and receiving with buzzer and Morse recorde at least a half hour every day. Two or three days of plain English. All of the rest of the work in code. Letters and figures interspersed. Spacing of groups to be emphasized. Cadets will be taught to write all messages in block (printed capital) letters. Zero is to be distinguished from the letter O by a dot in the center (0); figure 1 will be written with a short upstroke (1) to distinguish it from the letter I.

c. Work with the Lamp and Miniature Pameau should not begin until the seventh week, when men have attained considerable proficiency with the buzzer. A total of 4 hours is to be devoted to visual signalling. At first, single letters to be received and written down; then, groups of three or more symbols. Requirement 4 words a minute. (For description of pameau see Bulleton No. 27, October 11, 1917, and Photograph 2140.)

d. Two lectures on use of Radio Apparatus in the sixth week. Parts and connections of apparatus. Importance of directional control. Safety plug. Finding out and in of aerial. (See Stores 1 No.580, pp. 6 ff.)

8. Men who average proficiency are not to be held back. One group in a class may be working at better speed than the rest. Men of previous experience may be used to send to others.

9. The first division of each squadron will be given "passing out" tests at the end of each week at the rate of 8 words per minute, the other requirements for passing the final examinations remaining the same. A cadet who "passes out" passes the course provided he attends the classes in Visual Signalling and Radio, and practices buzzer as required at least fifteen minutes each day. He will be tested in this practice at the end of each week and a record of the tests will be kept. If the record shows that his work is falling off, more than fifteen minutes practice may be required.

10. Opportunity will be given to groups of two or more students to practice buzzer work by themselves, if they care to, in any free time.

11. At the Concentration Camp, Camp Dick, weekly tests will be given in buzzer and all cadets whose work falls below standard will be put upon a deferred list for assignment to flying school. Notice of this fact should be posted by instructors in all radio school rooms, as it will also be posted at Camp Dick.

12. Final Examination:

a. Sending; Morse Recorder used. Men to be given list of signals in code. Signals spaced and divided into groups, with figures in

different color from letters, as an aid to following with the eye. A minute's practice not counted may precede the test. Each man sends for two minutes at the rate of 6 words per minute, 5 letters to a word. Each letter of the alphabet and each figure to occur at least once in the examination. A cadet making more than 5 mistakes fails.

b. Receiving: Each cadet receives buzzer code for two minutes at the rate of 6 words per minute, 5 letters to a word. A minute's practice, not counted, may precede the test. Men who receive 15 symbols wrong are graded at the passing mark 60%. Each mistake above 15 shall count 1-1/3 per cent off.

c. In both sending and receiving tests intervals should occur irregularly and not uniformly at the end of five symbols. An interval omitted or displaced should count as an error.

d. There is to be no examination on Visual Signalling or on the Radio lectures.

e. No cadet is to be passed in Signalling who does not pass the sending test. The grades made in sending and receiving by each cadet in the Pilots' Course who passes the sending test are to be averaged to get his final grade in Signalling, and if this grade is 60% or above he is to be considered as passing in Signalling.

(Stencil No. 272.)

SYLLABUS FOR COURSES IN GUNNERY IN CITIZEN FORCE
SCHOOLS OF MILITARY INSTRUCTION
Revised October 14, 1918.

FOR MEN.

Subjects of Instruction will be as follows:

		Time Allotted.
1.	Lewis Gun.	
	(a) General description and nomenclature	3 Hours
	(b) Mechanism (notes to be given in full from stencil)	6 "
	(c) Stripping	4 "
	(d) Drill	1 "
	(e) Stoppages and immediate action (Inspection)	2 "
	(f) Care and Cleaning (Notes to be given in full from stencil)	2 "
	(g) Points before and after firing on range	1 "
	(h) Sighting, magazines, ammunition, etc.	1 "
		20 Hours
2.	Martin Gun.	
	(a) General description	3 "
	(b) Mechanism (Notes to be given in full from stencil)	8 "
	(c) Stripping	2 "
	(d) Drill (Loading and unloading)	2 "
	(e) Stoppages and immediate action	2 "
	(f) Care and cleaning	3 "
	(g) Points before and after firing on range	2 "23 Hours
2.	Ring Sights, Normen Vane foresight and Aiming (Under Ring Sights may be included the necessary instruction in the application of the Ring Sight to Trap Shooting)	5 "
4.	Range with Ring Sights (Not to exceed 25 rds. per period)	10 "
5.	S. M. Rifle (Nomenclature and Mechanism only)	2 "
	Examination	1 "
		Total 62 Hours

No range work will be carried out at Drown Schools.

(Stencil No. 272.)

FOR AUSTRALIA

Subjects of instruction will be as follows:

		Time Allotted
1.	Lewis Gun	
	(a) General description and nomenclature	3 Hours
	(b) Mechanism (Notes to be given in full from stencil)	6 "
	(c) Stripping	4 "
	(d) Drill	2 "
	(e) Stoppages and immediate action (Indoor work)	3 "
	(f) Care and Cleaning (Notes to be given in full from stencil)	3 "
	(g) Points before and after firing on range	2 "
	(h) Testing magazines, ammunition, etc.	2 "
		25 Hours
2.	Ring sights, Norman Vane Foresight and Aiming (Under Ring Sights may be included the necessary instruction in the application of the Ring Sight to Trap Shooting)	5 "
3.	Traps, with ring sights (Not to exceed 25 rds. per period)	5 "
	Examination	2 "
	Total	37 Hours

FOR OBSERVERS, CORPS D'ARMEE

Subjects of instruction will be as follows:

		Time Allotted
1.	Lewis Gun	
	(a) General description and nomenclature	3 Hours
	(b) Mechanism (Notes to be given in full from stencil)	6 "
	(c) Stripping	4 "
	(d) Drill	2 "
	(e) Stoppages and immediate action (Indoor work)	3 "
	(f) Care and Cleaning (Notes to be given in full from stencil)	3 "
	(g) Points before and after firing on range	2 "
	(h) Testing magazines, ammunition, etc.	2 "
		25 Hours
2.	Ring Sights, Norman Vane Foresight and Aiming (Under Ring Sights may be included the necessary instruction in the application of the Ring Sight to Trap Shooting)	5 "
3.	Traps, with ring sights (Not to exceed 25 rds. per period	10 "
	Examination	2 "
	Total	42 Hours

FOR FIGHTING OBSERVERS

The requirements as to instruction and the final examination in Gunnery for fighting observer candidates will be the same as those in the course for observers.

No range work will be carried out at Ground Schools.

SYLLABUS FOR COURSE IN AIRPLANES
UNITED STATES SCHOOLS OF MILITARY AERONAUTICS

October 14, 1918.

IV. AIRPLANES. 61 hours

Introduction.

The course in airplanes for pilots will occupy 49 hours, exclusive of the hours of instruction in engines. Fifteen of the 49 are given to lectures, 31 are spent in practical work, and 3 are reserved for final examinations. Laboratory periods are to be 3 hours in length, or more if necessary to avoid interruptions in the performance of a definite piece of work. The aim of the lectures is: (1) to establish in the cadet's mind the fundamental principles of flight, and the necessary contributing factors thereto, so that he will have a clear understanding of the parts of the ships and their working relation with each other; (2) to make him thoroughly familiar with the training type of planes. The practical work is done with the object of: (1) giving a clear meaning to the lectures, since the airplane parts referred to are seen and handled in their proper relation by the cadets themselves; (2) giving the cadet a practical grounding in the making of repairs which he may be called upon to make while in the field.

The lectures should be distributed through the practical work, in the order given. The lecture on Rigging should serve as an introduction to practical work in that subject.

The course for mechanics and observers consists of the first two weeks of the pilot's course.

General References:

Signal Corps Training Manual Part I, Aviation section of the Signal Corps; Training Manual of the Royal Flying Corps, Part I; Air Service Handbook (Lt. Col. L. . . .), Vol. I.

PRINCIPLES, LECTURES

1. Theory of Flight. 6 hours

Clear, untechnical instruction should be given on the cardinal principles and conditions of flight. As has been previously stated, especial emphasis should be laid on the various kinds of stability and the methods used for obtaining them, in order to give the cadet confidence in his machine. Formulae and mathematics will be avoided. Under these restrictions instructors will follow their own methods in teaching the subject. Below is a list of the chief points to be covered.

a. Primary forces - lift, drift, gravity, thrust.
b. Secondary factors - incidence, camber, stagger, streamline, aspect ratio, etc.
c. Conditions necessary for flight; for speed; for climb.
d. Balancing of forces; gliding angle; flying position, etc.
e. Lift-drift ratio, and the factors effecting it.
f. Stability; various kinds and how attained.
g. Control.

References:

The Aeroplane Speaks (H. Barber); Aviation (Algernon B. Perrinin); Aerial Navigation (Albert F. Zahm); Learning to Fly in the U. S. Army (E. F. Deiss); The Navy of the Army and Navy (Albert H. Munday); Aquiring Wings (William B. Stout); Air Service Handbook; Vol. 1 (U. S. Signal Corps).

More technical, for instructors; First Annual Report of the National Advisory Committee for Aeronautics, pp. 25-110; Second Annual Report of the foregoing, pp. 13-14, 555-629; Military Aeroplanes and Monoplanes and Biplanes (Grover C. Loening); The Mechanics of the Aeroplane (Capt. Duchene, translated by J. H. Ledeboer); The Aeroplane (A. Fage); The Design of Aeroplanes (A. W. Judge); Aerodynamics or Aeronautics (F. W. Lanchester); Course in Aerodynamics and Airplane Design (Alexander Klemin and L. H. Huff, published August 1916 - August 1917 in "Aviation"; Aircraft Mechanics Handbook (J. B. Colvin).

Instructors are also advised to familiarize themselves with the following works, which constitute the most essential printed "courses" of knowledge on the subject:

S. P. Langley, "Experiments in Aerodynamics", Smithsonian Institution, 1891, and "Researches and Experiments in Aerial Navigation", Gov't Printing Office, 1906.

Otto Lilienthal, "Birdflight as the Basis of Aviation," translated by A. W. Isenthal. Longmans Green, 1911.

A. G. Eiffel, "The Resistance of the Air", and Other Experiments conducted at the "Champs de Mars Laboratory", translated by Jerome C. Hunsaker, Houghton Mifflin, 1913.

Octave Chanute, "Progress in Flying Machines", N. L. Forney, N. Y., 1900, and "Recent Progress in Aviation", Annual Smithsonian Report 1910.

Wilbur Wright, "Experiments and Observations in Soaring Flight", 1903.

Nomenclature.

This subject will not be taught separately, as heretofore, but in connection with Rigging and Theory of Flight. A machine with all parts labelled should be used for this lecture. Instructors will bear in mind that they should be untechnical and their object should be to teach the functioning of the parts rather than names, so that the mention of the terms will bring to the cadet's mind a whole chain of purposes and interrelations and not merely barren verbal definitions. For further guidance on this subject consult Bulletin No. 146 for All Schools.

2. Rigging 5 hours

a. Alignment (Third Week) 1 hour

Its importance in flight; necessity of pilot being able to detect faulty rigging and to correct it. Effects on flight of the most common faults in alignment; why a machine flies one wing low, nose-heavy, tail-heavy, etc.

b. Wood, Nails and Screws (Fourth Week) 1 hour

Wood; different varieties used in airplane construction; comparative strength-weight ratios of various woods. Why wood and not metal is chiefly used in airplane construction. Factors affecting the serviceability of wood for various parts; cracks, seasoning, position in tree. Stresses; strain, tension, compression, torsion bending, shearing; those found in an airplane. Factors of safety of various members.

c. Fabrics and Dopes (Fourth Week) 1 hour.

Qualifications of an ideal fabric; of those actually used, linen and cotton. Strength and lightness. Process of covering. Purposes of dope; explanation of nitrate and acetate dopes; methods of application; inflammability. Use of varnish.

References: The Aeroplane Speaks, pp. 90-114; Notes on rigging for Air Mechanics, (entire); Manuscript Lecture Notes, U. S. A. (entire); Training Manual Royal Flying Corps, Part I; Military Aeronautics (W.C. Leoning) pp. 121-138; Method of Aligning the Curtiss JN4D (Stencil 356)

d. Wire and Fittings (Fifth Week) 1 hour.

Kinds of wire; solid wire, aircraft strand, aircraft cord; qualities and uses of each; comparative strength. Streamline wires. Fittings, turn-buckles, locking devices. Brief description of terminal splices (practical work under Care and Repair of Machines;) comparative efficiency.

e. Propellers (Fifth Week) 1 hour.

Explanation of pitch, pitch angle, slip (as encountered as possible), balance, degree of error, surface area, camber, straightness, joints, condition of surface, mounting, care of propellers. Why two-blade propellers are best for light motors, four-blade on large motors. Construction and nomenclature.

PAGE [illegible]

2. Aeronautics, continued 40 hours

a. Introduction (Third Week) 2 hours

Nomenclature and construction of an airplane. Functions of the various parts; of controls. Class gathered round a labelled machine. Brief outline of the content and purpose of lectures; its importance to pilots.

At this time a few general instructions should be given on the use of tools; when to use and not to use for certain purposes; e.g. pliers on turnbuckles. Another instruction on tools to be given when dopes are considered. The amount should be taught the effect of the various controls on a side while it is in flight, i.e. result if elevator control is pushed forward or backward, action of ailerons, rudder, etc.

b. Assembling and Alignments. 18 hours.

(1 hour in the third week, 4 hours in the fourth week, 4 hours in the fifth week, 6 hours in the sixth week, and 3 hours in the seventh week).

A few hours will be devoted to practice in assembling and disassembling wings, center section, struts and landing gear, in order to get the order firmly in mind. When all has been done, practice in alignment may be in. This should include, first checking and alignment (at least two hours) and alignment of the landing gear, tail surfaces, center section and control surfaces; setting and checking, lateral dihedral, stagger, incidence, wash-in and wash-out; over-all measurements; "rigging". Every effort will be made to make alignments as exact as possible, and if time permits, several times. Especial attention is to be given to the alignment of wings and control surfaces, by eye as well as by measurements. It is to be noted that 6 hours of this work occur in the 3rd and 4th weeks, 1 hour in the 3rd and 4 hours in the 4th. During this time the needs of novice and observers are especially to be borne in mind. After the fourth week the course is for pilots only.

3. Repair of Wooden 11 hours

a. Inspection (Second Week) 3 hours.

(1) Detailed Inspection. This part of the course will consist of an actual systematic inspection of an airplane from the standpoint of its acceptance or rejection as unsatisfactory. This inspection should be as complete, by the cadet, using forms and methods of inspection furnished all schools. Instructors will explain in detail what constitutes cause for rejection, especially with relation to the first and finally grade of wooden members.

(2) Inspection before flight. (See Stencil No. 101 (Pilots preliminary before flight) over).

This inspection can be as it would ordinarily be made by a pilot before taking to the air. The instructor should be very careful to explain points to which particular attention must be paid, such as control wires where they pass through the fabric or fittings, turnbuckles and fittings where they are secured to the lower longeron, tension on landing and flying wires, etc.

In all cases of inspection, the plane should be inspected by a different group of students than that which assembled it. The form of inspection will be furnished all schools promptly upon its completion.

b. Care of Machine (Fifth week). 3 hours.

Directions for packing and unpacking, loading on trucks and unloading. Rules for daily care of air frame and engine. This must be done by practical demonstration, using material from Section [illegible], Air Service Manuals, Vol. I.)

(Stencil No. 281.)

INSPECTION OF AIRPLANE.
(See Stencil No. 272, Repair of Machines, a (2), p. 14).

Pilot's Procedure Before Flight.

Inspection of an airplane should always begin at cock-pit to mounting wire and continue around airplane counter-clockwise.

A. In making this circuit be sure to examine all control lines, and see that they are not frayed where they come in contact with pulleys and guides.

B. See that all fittings have cotter-keys and are cottered.

C. Notice all turn-buckles to see if they are safetied.

1. Grasp horizontal stabilizer and see that it has necessary firmness.

2. See that horizontal elevator is firm - that all lines attached thereto are in good shape and that nuts are cottered.

3. See that hinge pins of elevator are cottered.

4. See that hinge pins of rudder are cottered. Examine horn and wires of rudder.

5. Examine stabilizer on right side as in paragraph 4.

6. See that pins holding upper and lower wings to body of the ship are safety wired. Examine each strut by sounding it with a short blow with the pulp of the hand.

7. Move ailerons in order that hinge pins can be seen, and be sure they are cottered.

8. See that wing skid is in proper shape.

9. On passing around to front of wings, stop on entering edge of lower wing in order that the top of the wing can be examined. Notice if horn has its cotter-keys cottered, and if elevator control wires are not frayed where they pass through the pulley.

10. Test landing and flying wires for proper tension.

11. Examine landing gear, see that its struts are not in any way damaged, that shuttle is in place, and all guy wires are in good shape.

12. See that propeller is not scarred or grooved. If tipped, see that no part of tip is loose. See that all nuts on hub are safetied.

13. Continue on left upper and lower wings as on the right wings.

14. If dual control and flying alone, see that safety belt in front seat is hooked over seat and no tools or loose objects are left in front cock-pit.

15. See that gas tank is in position, and gas tank is full.

16. Look inside of fuselage from rear cock-pit. See that there is no waste, paper, or any loose object in same.

c. Patching, Mending and Doping (Fifth Week). 3 hours.

Cadets should be instructed by demonstration and actual work in making permanent and temporary patches, sewing of tears, and patching with dope. Each cadet should cover a small surface such as the aileron or rudder, sewing cloth at open end and around ribs. See pages 45-47, Air Service Handbook, Vol.I.

d. Splicing and Soldering (Seventh Week). 2 hours.

Cadets will be instructed by demonstration in making French and American running eye splices and the relative efficiency of each. Give demonstrations of soldering, brazing, welding, showing advantages and disadvantages of each method, also hard and soft soldering processes, the object and use of fluxes. Explain things to be avoided such as overheating, grease, air bubbles, etc. Each cadet will make two splices.

e. Making Longeron (Seventh Week) 1 hour.

Cadets will be instructed by demonstration, the methods of bending a longeron, cutting a joint, glue, bolts, dowel pins, wrapping, varnishing, how to bend rib cap, and how to locate [illegible] ribs of a wing.

f. Propellers (Seventh Week) 1 hour.

Explain by demonstration the use of balancing cups and shaving blade, checking of pitch, track, curve of blades. Cadets will do this work in groups.

References: Training Manual Royal Flying Corps, Part I, pp. 10-16; Signal Corps Training Manual, Part I, Chap. III; Manuscript Lecture Notes; Inspection Manual, Signal Corps, U. S. A.; Aircraft Mechanics Handbook - Colvin.

4. Instruments (Third Week) 2 hours.

References: Signal Corps Training Manual, Part I, Chapters VI, VII; Training Manual Royal Flying Corps, Part I, pp. 60-100; [illegible] Army and Navy (A. E. Woodhy) Chap. I; General specifications, pp. 23-24, Second Annual Report, National Advisory Committee for Aeronautics; Bulletin Nos. 188, 662; Manuscript Lecture Notes; Inspection Manual, Instruments, issued by Air Information, Signal Corps.

Purpose and mechanism of the altimeter, barograph, air speed indicator, tachometer, oil and air pressure gauges, gasoline gauge, drift meter, inclinometer, method of use, testing, errors and corrections. (The compass is fully covered in the course on Navigation.)

5. Types (Fourth Week) 2 hours.

Service Planes.

The object of this lecture is to familiarize the cadets, in a general way, with the construction and specifications of the planes now being used by the United States military forces (See Bulletin No. 173 for all details), care of wings, airfoil and control machines. To aid in accomplishing the latter purpose part of the second hour should be spent on a test using silhouette cards of a few of the important types. (See Bulletin Nos. 100 and 110.)

References: Notes on the manufacturing of aeroplanes; Silhouettes; Various; Brief Technical Description of Service Airplanes (See Bul. No. 173).

SYLLABUS FOUR COURSE IN ENGINES IN
UNITED STATES SCHOOL OF MILITARY AERONAUTICS
October 14, 1918.

V. Engines 69 hours.

Introduction.

The course in engines will occupy 69 hours, of which 16 are to be spent on lectures, 50 on practical work and 3 are to be reserved for final examinations. Laboratory periods should be 3 hours or more in length to avoid interruption in the performance of a definite piece of work.

The aim of the theoretical work or lectures will be: (1) to establish in the cadet's mind the fundamental principles of internal combustion engines and their accessories; (2) to give the cadet a clear understanding of the parts of his engine; (3) to give the cadet a thorough understanding of the working relations of each part with the object in view of preventing trouble.

Lectures should be of a demonstration nature, it being the aim of the laboratory work (1) to give a clearer meaning to the lectures, since the engine parts referred to are seen and handled by the cadets themselves, and (2) to give the cadet the technical skill required so that he will be able to make minor repairs and adjustments should he be called upon to do so while engaged in field service.

It will be noted that the first four hours of lectures and the first five hours of laboratory work must be so arranged as to make a complete fundamental course in engines for bombers and observers, as these classes of cadets are split off from the pilots at the end of the fourth week of the course, and have no further instruction in engines.

General References:

Signal Corps Training Manual Part 1. (Aviation Section, Signal Corps)
Airplane Motors - Major Geo. E. A. Hallett.
Aviation Engines - Captain Victor W. Page.
Chart for Location of Airplane Power Plant Troubles - Captain Victor W. Page.
Dyke's Automobile and Gasoline Engine Encyclopedia.
Mechanical Engineers' Handbook.
Aircraft Mechanics Handbook - Colvin.

Special References:

Instruction books of various manufacturers.

LECTURES

1. Principles 12 hours.
   a. Engine Action. 3 hours
      (1) Essential requirements of aerial motors. (2) Power requirements. (3) Advantages of gasoline engines. (f) General principles of

6. Ferguine 1 hours.

...ulletin # 7, October 7, 1918.

Examination

A one hour written examination will be given at the end of the fourth week after twenty-three hours instruction. In the course for observers and observers this will be the final examination. At the end of the seventh week a two period final written examination will be given in the course for pilots.

...: Oral quizzes of short duration should be given at the discretion of the instructors and an examination of one-half hour's duration will be given at the end of each week.

explosive type of motors. (5) Power - bore- stroke - velocity - R.P.M. - source of power - heat - pressure - transmission of power - piston - connecting rod - wrist pin - crank pin (throw) - crank web - crank shaft - intake and exhaust valves - location of valves - cam - cam shaft - cam follower - tappet rod - rocker arm - gears - gaskets - bushings - bearings - bearing clearance - shims - thrust bearings. (6) Cycle of operations: (a) Intake stroke - position of valves - suction - charge - intake manifold; (b) Compression stroke - position of valves - compression - low compression - piston rings - cast iron - heat - re-ignition; (c) Power stroke - position of valves - combustion chamber - heat loss - back-kick - misfiring - exhaust valve leads; (d) Exhaust stroke - position of valves - heat loss - back firing - piston travel; (e) Valve timing - timing - purpose - method. (7) Multi-cylinder engine - working strokes - smooth arrangement of cylinders (a) vertical; (b) Vee; - firing order

b. Carburetion 2 hours

Fuel - principles of carburetion - principles of the simple carburetor - float feed - venturi tube - choke and altitude adjustments - throttle - mixing chamber - rich mixture (effect) - lean mixture (effect) - difficulties in use of single jet carburetor - Zenith carburetor - main jet - compensating jet - priming tube - priming well - effect of altitude on carburetion.

c. Ignition 3 hours.

Elementary electricity - definition of terms and units of measurements - electrical ignition systems - magnetos - airplane ignition (Berling and Dixie magnetos, Delco battery system) - care and testing of magnetos - spark plugs - timing ignition - (1) meaning; (2) purpose; (3) methods - sequence of firing. Complete instruction on Berling and Dixie magnetos or equivalent; complete instruction on Delco battery ignition.

d. Lubrication 1 hour.

Importance of lubrication. Oil film - fluid friction. Requirements of lubricant - body, fluidity - conductor of heat, etc.,etc. Must not vaporize from heat or coagulate or leave injurious deposits, etc. Kinds of lubricants,- petroleum - castor oil. Pumps (lunger, gear) gauge - pressure relief valve- filter screen - sump - reclamation. Lubrication systems (force feed, full force feed, gravity and splash).

e. Cooling 1 hour.

Air cooling - water cooling - radiator - water jacket - pump (gear and centrifugal) - Thermo-syphon. Anti-freezing mixtures. Advantages and disadvantages of air and water cooling.

f. Trouble Shooting 2 hours.

Causes of noisy action - misfiring - overheating - loss of power - failure to start - failure to stop - failure to throttle down - back firing.

Outline method of locating troubles by elimination - give causes and remedy for common troubles.

Reference: Curtiss Hand Book on Standard Model OX Motors, pp. 29-34.

2. Types 4 hours.

a. Rotary Engines 2 hours.

Principles of rotary engines. Arrangement of cylinders - crank shaft center - crank pin center - rotation of cylinders - firing order - rotation of pistons - transmission of power - length of stroke - reason for odd number of cylinders - cycle of operations - carburetion - valves and cams - timing of valves and magnetos. Method of lubrication - cooling materials employed - advantages and disadvantages of rotary motors. Explain difference between various types of rotary motors - Gnome - Le Rhone - Clerget.

Note: This lecture is intended only to give the cadets a general knowledge of rotary motors, a detailed study of which will be given at advanced flying school.

b. Hispano-Suiza 1 hour.

Details of construction. Method of fitting cylinder sleeves and reasons why aluminum castings are used - valve action - Follow instruction book and bring out wherein this motor differs from the usual Vee type.

c. Liberty. 1 hour.

Follow instruction book - outline cylinder construction and material - valve action - angle of cylinders and why so placed - piston construction - generator installation - oiling system - bearing installation - timing - firing order, etc.

PRACTICAL WORK 56 hours

3. Shopwork

Sketching.
Whenever practicable student should be required to sketch various parts of engines, magnetos and carburetors as well as wiring diagrams.

a. Engine Studies. 18 hours.

Cadets in groups of not less than four nor more than six, will assemble and disassemble at least two engines - check timing - clearance - lubricating systems - cooling systems - materials and specifications of each - note procedure in tearing down and assembling. Instruct in useof tools in connection with their use. Take apart and study oil and water pumps, etc., cooling and oiling systems.

b. Cooling and Oiling Systems, 1 hour.

Cadets in groups of not less than four nor more than six should fit

water connections and make paper gaskets. By demonstration show how to stop leaks temporarily by use of tape, etc. Explain setting of oil pressure relief valve, testing flow of oil at various points.

Note: This work should be done in addition to that which is done under Engine Studies.

c. Carburetor. 2 hours.

Cadets in groups of not less than four nor more than six should take down Zenith carburetor, remove and clean all jets, check float level, remove Venturi, reassemble and install carburetor on motor, make all gaskets and check for air leaks.

d. Ignition. 6 hours.

Have cadet take apart and assemble a Dixie or a Berling magneto. In assembling cadet should assemble machine torn down by others, each magneto when assembled to be tested. Instruct as to care of magnets, etc. Each cadet to prepare chart, tracing current from origin to plugs. Take down and reassemble Delco distributor and switch block. Prepare chart showing travel of current in Delco Liberty system. Check breaker points for clearance and condition. Test and flush Liberty battery.

e. Valves and Cylinders. 2 hours.

Explain by demonstration how to remove valves from cylinder -- clean the carbon from valves and cylinders and grind valves. Also demonstrate by comparison cylinders and valves in good and poor condition.

f. Pistons. 1 hour

Explain by demonstration when a piston is in poor and when in good condition. Show method of cleaning thoroughly and brushing with mineral wool. Outline importance of cleaning ring grooves thoroughly and having proper elasticity to the rings, and not too much side play in grooves. Demonstrate good and bad rings, explain clearances. Show method of fitting.

g. Bearings 1 hour

Explain that is meant by bearing clearance, why differences are allowed in various motors, why some bearings have oil grooves and others are plain. By demonstration show how to fit a connecting rod bearing and cap. Explain the use of bearing scraper and how to secure clearance. Familiarize cadet with amount of pull necessary to turn over motor in which bearings are properly fitted.

h. Inspection before Flight 1 hour.

Outline systematic method of inspecting motors and accessories previous to flight. The form for this inspection is being made up and will be furnished all schools.

4. Engines Running 18 hours

Trouble Shooting.

Cadets will locate and correct faults in carburetion and ignition system

system of motors on test blocks, set oil pressure relief valves, find causes of overheating, irregular and back firing, etc. Motors should be prepared for trouble shooting by instructors in such troubles as bent valve, improper timing, insufficient valve clearances, bent rocker arms, plugged carburetor jets, short circuited plugs, water in carburetor bowl, etc., and the method of adjustment explained. Cadets should be required to adjust motor so as to have it functioning properly at the required number of RPM with standard propeller or engine installed.

Reference: Curtis Hand Book on Standard Model OX Motors, pp. 29-34.

Examinations 3 hours

A one hour written examination will be given at the end of the fourth week after nine hours of instruction. In the courses for bombers and observers this will be the final examination. At the end of the ninth week a two period final written examination will be given in the course for pilots.

Quizzes.

NOTE: Quizzes of short duration should be given at the discretion of the instructors and an examination of one-half hour's duration might well be given at the end of each week.

SYLLABUS FOR COURSE IN OBSERVATION

UNITED STATES SCHOOL OF MILITARY AERONAUTICS
October 14, 1918.

VI. OBSERVATION 56 hours

1. Maps

This course consists of two parts, (a) Maps, 10 hours and (b) Geography, 8 hours, with an examination of 1 hour covering both subjects.

a. Maps. 10 hours

References: As given in Stencil No. 157; also Stencil No. I. A. 300; the page of references in the description of the course which follows are to the pages of Stencil No. I. A. 300.

Each lecture should be of one hour's duration, followed by one or two hours of laboratory exercises as suggested, in order to apply the principles explained in the lectures and drive them home by reiterated application.

Lecture 1. (pp. 1-5, omitting Orientation) 1 hour.
Laboratory, 1 hour.
Exercises based on the above lecture, including not only such examples as are given on p. 6, but also examples on distance and time scales, and problems in the use of R. F.

Lecture 2. (pp. 7-13) 1 hour.
Laboratory, 2 hours.
Exercises based on the above lecture, one of which should be devoted to sketching a contour map to conform to a complete detailed description. This description should be such as to require the use of the more common conventional signs as well as various combinations of contours.

Lecture 3. (pp. 14-17) 1 hour.
Laboratory, 1 hour.
Exercises on pin-pointing and practice with the British system.

Lecture 4. (pp. 17-19, and the paragraphs on Orientation, p. 3) 1 hour.
Laboratory, 1 hour.
Problems with French maps, and one-half hour quiz on the course to this point.
Laboratory, 1 hour.
Exercises in orientation and pin pointing on the rotary map.

Examination. One-half the examination periods in the fourth week will be devoted to testing the cadets in the foregoing work.

b. Geography. 8 hours.

Purpose:

(1) To give the cadets some introductory knowledge of maps.

(2) To give the cadets a thorough knowledge of the salient features of the geography of Northwestern Europe. The ability to make a free-hand map of this region, showing the chief mountains, rivers, and cities, and the boundaries of the countries studied, will be considered an essential test of the cadet's mastery of this part of the course.

(3) To give the cadets a sufficiently close knowledge of the eastern front to enable them to understand and remember the general course of the War in that region.

(4) To acquaint the cadets with German industrial geography, routes of transportation, centers of distribution, etc.

Distribution of time.

Lecture on maps in general. 1 hour.

Lecture on the freehand map of Northwestern Europe. 1 hour.

Drill in black-board work, etc, on the freehand map. 2 hours.
(See attached photograph)

Lectures on the geography of eastern front and the course of the war to date in that region. 3 hours.

Lecture on German industrial geography. Transportation, coal and iron deposits, industrial centers, etc. 1 hour.

Examination 1 hour.

One half the hour to be devoted to maps and one half to the foregoing course in Geography.

Details of the Course in Geography.

(1) Maps. 1 hour.

(a) Finding North.
By night; the North Star, and the neighboring constellations.
By day; the Sun and the watch; the usual orientation of churches in Europe; the flow of rivers of Northwestern Europe.

(b) Meridians.
Mercator's projection and other compromises.

(c) Parallels of latitude. Latitude and longitude. Value of a degree.

(d) Scales.
R. F.
Comparative areas, Europe and the U. S.
Latitude of European countries compared with U. S. (Davis, Pg e 6).

(2) The Geography of Northwestern Europe. 1 hour.

(a) Mountains and plains.
1. The Alps
2. The Vosges
3. Mountains of Germany
4. The Ardennes.
5. The Paris basin.
6. The coastal plains of
   (a) France
   (b) Belgium
   (c) Holland
7. The great German Lowlands.

(b) Rivers.
1. General remarks (Character, direction of flow, etc.)
2. The Rhine and its system.
3. The Somme.
4. The Aisne and the Marne.
5. The Meuse.
6. The Rhine and its other tributaries.
7. The Yser.
8. The Lys.

(c) Cities and boundary lines.
Shapes and directions emphasized.
Instruction in drawing the freehand map.

(d) Routes of travel and communication.
1 Distributing centers.
2. Ports.
3. Railways and bridges.
4. Main highroads.
5. Canals.

(5) Drill on the freehand map. 2 hours.

This drill should be done with small sections of not more than 15 cadets. Each cadet should receive thorough drill at the blackboard and on paper. The map should be drawn again and again, starting from all sorts of points of departure - such as a boundary line, a city, a mountain range, etc. etc. Special care should be given to relative proportions and directions.

(6) Continuation of drill on freehand map. 1 hour.

The location on the map of the rivers named in (2), and of the following towns should be made with a good deal of accuracy.

1.	St. Nazaire.	12.	Antwerp
2.	Le Havre.	13.	Louvain
3.	Paris	14.	The Hague
4.	Nancy	15.	Strasburg
5.	Metz	16.	Frankfort
6.	Amiens	17.	Coblenz
7.	Calais	18.	Cologne
8.	London	19.	Treves
9.	Dover	20.	Hamburg
10.	Southampton	21.	Berlin
11.	Plymouth	22.	Berne

Practice should be given in estimating distances, both from memory and from the map itself.

(5), (6), (7). The Western Front. 3 hours.

The discussion in these three lectures should not attempt to deal with tactics but with the effect of the local topography on the general course of operations on the western front from 1914 to the present date. The necessary basis for these lectures will be found in the following two books:

Johnson, D. W., "Topography and Strategy in the War", pp. 1-9.
Davis, C. H., "Problems of Northern France".

Any standard works on the course of the war in the east will enable the instructor to work out an authoritative outline of the sequence of events,

but it should never be lost sight of that the object of the whole study is to show the close relation between topography and strategy.

The battle fronts should be located on the freehand map, and then studied more in detail. The positions of famous points should be emphasized, such as:

Hartmannswillerkopf.	The Marne.
Mont-s-Mousson	The Vesle
St. Mihiel.	The Aisne.
Verdun	The Ailette.
Bois of Mt. Wood.	The Oise.
Chateau Thierry.	The Somme
Rheims	The Lys.
Forest of St. Gobain.	The Canals.
Cambrai.	
Arras.	
Ypres and the Passchendaele ridge.	

Lines of communication should be discussed, and some understanding given of the limitations to the use of numbers of troops on a limited front.

(8) Industrial Geography of Germany. 1 hour.

The object of this lecture is to familiarise the cadets with the general distribution of German industries, and with the German railway systems. A secondary object is to assist an airplane to find its bearings on the German side of the lines, and for this purpose emphasis should be placed on the location of congested manufacturing districts and their relations to rivers and railways; on the location and extent of agricultural districts; mining regions; the Rhine bridges; cathedral towns and their surroundings; main high-roads; etc., etc.

Examination 1/2 hour, as noted above.

2. Navigation 15 hours.

Reference: Stencil No. I. S. 268. (Page references in the following outline of lectures are to this stencil.)

It is to be noted that the division of the subject matter into five lectures as here outlined is not obligatory, but that the instructor may alter the division or the number of lectures if experience proves it desirable. In all, fifteen hours are to be devoted to Navigation; it is believed that the best results will be obtained by giving the larger part of this time to the working out of problems with the floor map and rotary map. Problems in Navigation may be combined with the problems nos. 4 and 5 for the rotary map outlined in Bulletin No. 299.

Lecture I. (pp. 1-10, through paragraph VII)

Lecture II. (pp. 25-27, and 10-13)

Lecture III. (pp. 20-24)

Review and problems.

Lectures IV & V. (pp. 14-19)

Use of instruments and application to problems.

Ten hours to be given in the miniature range on problems in Navigation. Problems like those described on page 20, Stencil No. 107, numbers X, XI, XII,

(Aircraft No. [illegible])

a different phase upon the [illegible]

[illegible]

[illegible] given in the first week of the [illegible]' course. In the [illegible] course a flexible combination of two hours in navigation and meteorology will be given in the fifth week.

3. [illegible]

Aircraft No. 117. The outline of the ground to be covered, on page 14.

[illegible] will be given in the combined subjects of Navigation and Meteorology in the fifth week of the [illegible]' course. 1 hour.

4. Cross-country with Pilots -- Lectures (for pilots and observers only) 1 hour.

Five hours of lectures as outlined in Aircraft No. 117.

[illegible] 1 hours.

a. [illegible] use of [illegible] 1 hour.

b. [illegible] be given. [illegible] the Instructor. Class assign [illegible] every half hour. If this is impossible, [illegible] 2 hours.

1 hour.

[illegible]

[illegible] Aircraft No. [illegible].

(In the above two courses 1 hour is [illegible] of the [illegible] combined meteorology [illegible] to be forwarded later.)

5. [illegible] for pilots = 11 hours
for observers = 38 hours

[illegible] 2 days

Appendix No. FS.

(Stencil No. 292)

Training Section,
Ground Schools Branch.

D.S.McC.'mrc

WAR DEPARTMENT
Office of the Director of Military Aeronautics
Washington

November 6, 1918.

BULLETIN NO. 348 TO ALL SCHOOLS

1. Inclosed herewith is Stencil No. 272, Curriculum for the U. S. Schools of Military Aeronautics Revised October 14, 1918. Additional copies of this Stencil have been sent to the Schools under separate cover.

2. Attention is invited to the following changes in Stencil No. 272 from the typewritten copy of the Curriculum revised October 14, 1918 sent to the Schools on that date. These changes were made in order to facilitate the carrying out of the provisions of Memorandum No. 340 For All Schools.

3. In Military Subjects the lectures on Methods of Modern Warfare are to be given in the second and third weeks, in order that the cadets may be instructed in the respective parts played in aerial operations by the pilots, army corps observers, bombers and fighting observers before they state their preferences. To make room for these seven lectures in the second and third weeks, an hour has been added in the second week and the three hours of Military Hygiene and the four hours of Military Law have been postponed to the fifth and sixth weeks. An examination of one hour, to cover Military Hygiene, Military Law, and the lecture on Morale, has been added to the sixth week.

4. In Engines, three hours of shop work have been transferred from the eighth week to the ninth week.

5. In the subject of Observation, separate final examinations are to be given on

(a) Navigation
(b) Cooperation with Artillery
(c) Photo Interpretation
(d) Bombing

6. The two-hour final examination on Photo Interpretation in all three courses will be taken from the hours allotted to that subject in the typewritten copy of the curriculum. This change will give 18 hours of instruction and 2 hours of examination in the Pilots' and Bombers' courses and 38 Hours of instruction and 2 hours of examination in the Observers' course.

7. A final examination of one hour on Navigation will be given in the sixth week of the Observers' and Bombers' courses. The two hours of Meteorology in the Pilots' course has been moved up from the ninth to the eighth week; this ex-

Ground Schools Branch.

Office of the Director of Military Aeronautics

amination will be final on these two subjects.

8. One of the lectures on Cooperation with Artillery has been moved from the sixth to the seventh week of the Observers' course and from the ninth to the tenth week of the Pilots' course. A final examination of one hour on Cooperation with Artillery will be given in the seventh week of the Observers' course. There will be no set final examination on Cooperation with Artillery in the Pilots' course. Tests may be given as found necessary, as provided in paragraph 8, Memorandum No. 340 For All Schools.

9. In the Bombers' course, the instruction in Bombing in the sixth week has been reduced from 5 hours to 3, and the 2 hours inserted in the eighth week. A final examination of one hour on Bombing will be given in the eighth week.

10. The Syllabus for the course in Signalling is included in Stencil No. 272. It will be noted that the requirements in receiving in the final examination have been reduced from 90% correct to 75% correct. It will also be noted that a pilot candidate who passes the final sending examination but failes in receiving will be passed if his average on the two is 60% or better. A pilot candidate who fails in receiving will therefore be given a percentage grade based on the actual proportion which the number of symbols which he received correctly is of the 45 symbols required for passing; that is, a cadet who receives less than 45 symbols correctly will be given 1-1/3% for each symbol correctly received.

11. Attention is invited to paragraph 11 of the Syllabus for course in Signalling. This policy should be brought to the attention of all cadets by the Instructors in Signalling.

12. The Syllabus for the course in Gunnery is included in Stencil No. 272. It will be noted that there is no separate course in Gunnery for Fighting Observer candidates. Cadets re-classified as Fighting Observer candidates must meet the same final examination requirements as Observer candidates before being graduated.

By direction of Major General Kenly:

D. H. Crissy,
Major, S. C.

Incl.

APPENDIX F7

Contains the following:

Memorandum No. 340 - (4 pages)
Memorandum No. 342 - (1 page)
Memorandum No. 350 - (1 page)
Rating Sheet, Squadron D - (1 page)

Training Section
Ground Schools Branch.

APPENDIX

WAR DEPARTMENT
OFFICE OF THE DIRECTOR OF MILITARY AERONAUTICS.
Washington.

October 30, 1918.

MEMORANDUM NO. 340 FOR ALL SCHOOLS.

1. Memorandum No. 295 For All Schools is hereby revoked. The classification, demotion, reeducation and transfer of cadets shall be governed by the following rules.

2. Each cadet shall be carefully observed from the time he enters the School, with a view to determining to which of the following classes he belongs:

A. Flying Officer material
B. Air Service material (enlisted)
C. Of no value to the Air Service.

3. Cadets of class "A" shall be retained in the Ground Schools, as Observer, Corps d'Armee, candidates, Bomber candidates, Pilot candidates, or Fighting Observer candidates, until they may be properly certified for graduation.

4. Cadets of class "B" shall, in accordance with the provisions of paragraph 6, be relieved from duty as cadets and assigned to Air Service organizations.

5. Cadets of class "C" shall, in accordance with the provisions of paragraph 6, be relieved from duty as cadets and, subject to proper instructions, transferred to another branch of the service.

6. Any cadet who at any time gives evidence of not being Flying Officer material, because of insufficient previous education, insufficient mental capacity, military inaptitude, lack of proper spirit, or temperamental or moral unfitness, or like cause, shall be called before a Board of Officers and, if the Board so recommends, shall be relieved from student duty. In case the Board recommends relief from student duty it shall also determine whether the cadet is to be classified as soldier material of value to the Air Service or as of no value to the Air Service. Failure in academic studies shall not be a cause for relief from student duty. This does not mean, however, that repeated failures in the same subject shall not be considered presumptive evidence of insufficient mental capacity for a candidate for a commission.

7. No grades shall be given except on examinations.

8. Any cadet who, in the opinion of a competent instructor, is not making satisfactory progress may be given a suitable test to determine

whether he shall continue with his class or be demoted.

9. Any cadet who fails in Military Subjects in the third week shall be demoted and reeducated in this Subject.

10. Any cadet who fails in Signalling in the third week shall repeat the work of the second and third weeks. He may, however, be excused from repeating Military Subjects if he has obtained a satisfactory grade in that Subject.

11. Upon entering the fourth week of the course each cadet shall state in writing which of the four courses, Observers, Bombers, Pilots, or Fighting Observers, he prefers, or the fact that he has no preference.

12. During the fourth week of the course each cadet shall be examined by a Rating Board and given a rating on his Special Qualities and on his Previous Education, in accordance with paragraphs 18 and 19. The Rating Board shall be composed of three members and shall include the Personnel Adjutant and the President of the Academic Board.

13. At the end of the fourthweek of the course each cadet shall be given a total rating based on his Special Qualities, Previous Education, and examination grades in the academic subjects through the fourth week. In computing the total rating, the ratings in Special Qualities, Previous Education and the grades in the several academic Subjects shall be weighted as follows:

1.	Special Qualities	12½
2.	Previous Education	12½
3.	Observation	30
4.	Signalling	25
5.	Airplanes	8
6.	Engines	6
7.	Military Subjects	6
	Total	100

14. After the individual ratings have been determined the members of the class shall be listed in the order of their ratings.

15. The quota of Observer candidates shall be taken from the list first. Those cadets who have expressed a preference for the Observers' course will be assigned to that course from the list in the order of their ratings, until the quota is complete. If the number of those who have expressed a preference for the Observers' course is less than the quota, cadets shall be assigned from those who have expressed no preference, in the order of their ratings, until the quota is complete. If these two groupds do not complete the quota, the additional number required shall be assigned from the list of those remaining, in the order of their ratings.

16. The quota of Bomber candidates shall then be assigned from the list of those remaining, in the same manner. Those who have expressed a preference for the Bombers' course shall be assigned to that course in the

whether he shall continue with his class or to drop

5. Any class who fails to maintain honors in the
shall be demoted and read cubed in this Subject.

peek the work of the second and third weeks. He may, however, be excuse
that Subject.

11. When entering the fourth week of the course each cadet shall
writing which of the four courses, Observers, Bombers, Pilots, or
Operating Observers, he prefers, or the fact that he has no preference.

12. During the fourth week of the course each cadet shall be
ained by a Boxing Board and given a rating on his Social Qualities and on
his Previous Behavior. In accordance with Paragraphs 13 and 10. The
Board shall be composed of three members and shall include the Personnel
Adjutant and the President of

13. At the end of his fourteenth of the course each cadet shall be
given a total rating based on his Social Qualities, Previous Behavior,
ombined the total rating, the ratings in Special Qualities, Previous Behavi
s in the several academic subjects shall be ranked as follows:

1. [illegible]
2.
3. Observation
4.
5.
6.
7. Aviation Engineering

11. [illegible] have been ascertained the members
of the class shall be listed in the order of their ranking.

12. The grade of Observer Graduate shall be taken from the l
[illegible] received a preference for the
will be assigned to that course from the list in the order of their

assed a preference for the Observer course is less than the prob
ourse shall be assigned from those who have expressed no preference. In
ase of ties in rank, the cadet who has the longer service in the
preceding graduation shall be ranked above the other. If t
cannot be determined by the above rule, the additional number received shall be
assigned from the list of those remaining. In the order of their ra

13. The grade of Bomber candidates shall then be assigned from th
list of those remaining. In the

order of their ratings until the quota is complete. If the number in this group is less than the quota, cadets shall be assigned from those who have expressed no preference, in the order of their ratings, until the quota is complete. If the quota cannot be supplied from these two groups, the additional number needed shall be assigned from the list of those remaining in the order of their ratings.

17. Those men whose names remain on the list shall then be assigned to the Pilots' course.

18. In determining the cadet's rating on Special Qualities, the following are the qualities to be considered: Maturity, Judgment, Accuracy, Alertness, and Tenacity of Purpose. It is to be borne in mind that the cadet is to be rated on certain qualities which are important for a special type of aviation work and not on his efficiency in general as a candidate for commission as a flying officer.

19. In determining the cadet's rating for previous Education, the subject of greatest value is Mathematics, including Algebra, Geometry, Logarithms, and Trigonometry. Subjects such as Drawing, free hand and mechanical, Surveying, Physics, and Chemistry, which tend to develop accuracy of observation,measurement and recording, are also of value.

20. Any cadet assigned to the Pilots' course who failed in Airplanes, Engines or Maps in the fourth week shall be demoted and reeducated in that subject or subjects in which he was deficient.

21. Any cadet assigned to the Observers' or Bombers' course who failed in Maps in the fourth week shall be demoted and reeducated in the subject.

22. Any cadet who fails in Theoretical Military Subjects or in Gas Defense in the sixth week shall be demoted and reeducated in the subject in which he is deficient.

23. Any cadet in the Pilots' course who fails in the final examination in Airplanes, Engines, or Navigation shall be reclassified as a Fighting Observer candidate.

24. Any cadet in the Observers' course who fails in the final examination in Navigation, Cooperation with Artillery, Photo Interpretation, or Signalling, shall be reclassified as a Fighting Observer candidate.

25. Any cadet in the Bombers' course who fails in the final examination in Signalling, Navigation, Photo Interpretation, or Bombinb shall be reclassified as a Fighting Observer candidate.

26. Any cadet reclassified as a Fighting Observer candidate who has passed the final examination in Gunnery on the Lewis Automatic Rifle and Ring Sights shall be certified as a graduate in the Fighting Observers' course.

assigned to the Pilots' course.

type of aviation work and not on his efficiency in general as a candidate

of observation,measurement and reporting, are also of value.

Flying, Engineering, and Navigation, which need to develop accurate

plumes, engines or bugs in the flight must all be demoded and reobserved

in that subject or subjects in which he was deficient.

Called in Code in the Course's or Bombers' course who

subject.

Pilot examination in Airplanes, Engines, or Navigation shall be re-

classified as a Flying Observer candidate.

or qualified, shall be reclassified as a Flying Observer candidate.

examination in Signalling, Navigation, Photo Interpretation, or Bomb shall

Flying Observer candidate.

has passed the final examination in Gunnery or the Bomb Automatic Pilot a

Flying Pilots shall be certified as a graduate in the Flying Observers'

Curriculum.

27. Any cadet reclassified as a Fighting Observer candidate before he has taken the final examination in Gunnery on the Lewis Automatic Rifle and Ring Sights shall concentrate on that Subject, to the exclusion of other academic subjects, and upon passing the final examination shall be certified as a graduate in the Fighting Observers' course. Provided that if any cadet in the Observers' or Bombers' course is reclassified as a Fighting Observer candidate in the sixth week, has also failed in Theoretical Military Subjects or in Gas Defense, in the sixth week, he shall be reeducated also in one or both of these subjects accordingly as he is deficient and shall not be certified as a graduate until he has passed the examinations in both.

28. Any cadet reclassified as a Fighting Observer candidate who has failed in the final examination on the Lewis Automatic Rifle and Ring Sights, or who fails in that examination after he has been so classified, shall concentrate upon that subject to the exclusion of all other academic subjects, and upon passing the examination shall be certified as a graduate in the Fighting Observers' course.

29. Any cadet in the Pilots' course who fails in the final examination in Signalling, Gunnery, or Photo Interpretation, shall be denoted at the end of the twelfth week and reeducated in the subject or subjects in which he is deficient and upon passing the examination in the subject or subjects shall be certified as a graduate in the Pilots' course.

By direction of Major General Kenly:

M. F. DAVIS,
Colonel, S. C.
Chief of Training.

By direction of Major General Norton:

Colonel, A. G.
Chief of Training.

Curriculum. (Stencil No. 286)

Address reply in duplicate to
Director of Military Aeronautics
Washington, D. C.
Training Section,
Ground Schools Branch.

WAR DEPARTMENT.
Office of the Director of Military Aeronautics
Washington.

November 1, 1918.

MEMORANDUM NO. 342 FOR ALL SCHOOLS.

1. Inasmuch as the requirement that the Personnel Adjutant should interview and accomplish qualifications cards for all entering cadets has been cancelled by Letter from Office, Director of Military Aeronautics, dated October 4, 1918, Subject: "C.C.C.P.1 cards in Ground Schools", the requirement in paragraph 12, Memorandum 340 For All Schools that the Personnel Adjutant should be a member of the Rating Board is hereby revoked.

2. The following rules of procedure will be followed by the Rating Board in determining the ratings of cadets:

a. Each cadet shall first be rated by each member of the Rating Board separately.

b. In rating a cadet, the member of the Board shall give him a grade on each of the five qualities. There shall be but four grades, viz: "Excellent"; "Good"; "Fair": and "Poor". The respective numerical values of these grades shall be as follows: "Excellent"- 20; "Good" - 15; "Fair" - 10; "Poor" - 5.

c. The sum of the numerical values of the grades given the cadet in the five qualities by a member of the Board shall be the rating given him by that member.

3. Inasmuch as the requirements of Memorandum No. 295 and Memorandum No. 306 For All Schools as to weekly grades in Efficiency have been superseded by Memorandum No. 340 For All Schools, the giving of weekly grades in Efficiency will be discontinued.

By direction of Major General Kenly:

D. H. CRISSY,
Major, Signal Corps.

APPROVED:

CUSHMAN HARTWELL,
Major, J.M.A., S.C.
Executive Officer.

Appendix F7.

Curriculum.

Training Section,
Ground Schools Branch.

WAR DEPARTMENT
Office of the Director of Military Aeronautics
Washington.

December 3, 1918.

MEMORANDUM NO. 350 FOR ALL SCHOOLS.

1. Inasmuch as no cadet will, hereafter, be classified as an Observer or Bomber unless he prefers such classification to Pilot training, the preparation of the rating list provided for in Memorandum No. 340 For All Schools, will be discontinued.

By direction of Major General Kenly:

D. H. CRISSY,
Major, S. C.

APPROVED:

M. F. DAVIS,
Colonel, A.S.M.A.
Chief of Training.

1st Ind.

From: President, Academic Board. To: Commandant, S.M.A., Berkeley, Cal.
Dec. 10th, 1918.
Noted for compliance. Copy taken for this office.

B. M. Woods.

Training Section,
Ground Schools Branch.

Office of the Director of Military Aeronautics

December 3, 1917.

MEMORANDUM NO. 350 F.T. AIR SERVICE.

[illegible] cadet will, hereafter, be classified as
an Observer or Bomber unless he receives over classification to Pilot
[illegible]. 350 for All Schools, will be discontinued.

[illegible]
[illegible], U. S. C.

Colonel, G.S.A.S.

[illegible]: Aircraft, Academic Board. For Department, C.S.A., Berkeley, Cal
Dec. 10th.
[illegible]ed for examination. Copy taken for this office.

[illegible]. Reece

Appendix F7.

UNITED STATES
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

SQUADRON D
RATING SHEET

Week ending Nov. 23, 1918.

QUOTA
OBSERVERS .....
BOMBERS .....
PILOTS .....

	Special Qualities, 12½%						Previous	Education, 12½%	Observation, 30%	Signalling, 25%	Airplanes, 8%	Engines, 6%	Military Subjects, 6%	Total Rating Basis, 100	Rating Order Number	Preferance	Assigned		
	Maturity	Judgment	Accuracy	Alertness	Tenacity	Total, Basis, 12½											Observers	Bombers	Pilots
Black, H C	15	17	14	14	15	375	9½	11	24	25	7	4	4	84½	3	Pi	0		
Bliley, G A	13	13	15	11	11	315	8	8	21	24	6	4	4	75	20	Pi			P
Burkhardt, C S	13	13	14	12	13	325	8	10	20	24	7	5	4	78	12	Pi			P
Burns, E J	17	17	14	14	16	390	10	7	22	23	6	5	4	77	17	Pi			P
Castendyck, C H	15	15	16	14	15	375	9½	9	25	18	6	5	4	77½	16	Pi			P
Colvin, R C	16	15	15	15	16	385	9½	12½	28	25	6	5	4	90	1	Pi	0		
Dimmick, G B	16	14	20	17	16	415	10½	11	26	22	6	5	4	84½	4	Bo	0		
Haldeman, H F	13	13	11	11	14	310	8	9	28	21	5	4	4	79	10	Pi		B	
Hess, H W	18	18	16	18	19	445	11	12½	20	15	7	4	4	73½	23	MP	0		
Hewlett, W A	15	15	13	14	14	355	9	11	22	22	5	5	4	78	13	Pi			P
Hughes, H F	15	13	14	15	14	355	9	10	20	19	5	4	3	70	28	Pi			P
Irwin, R A	15	11	13	11	13	315	8	10	18	19	3	4	4	66	29	Bo			
Lamberton, H de A	14	15	11	13	16	345	8½	8	28	21	6	4	4	79½	9	Pi		B	
Lewis, G I	14	14	14	15	17	370	9	10	23	21	6	5	4	78	14	Pi			P
Mattenlee, J H	15	16	15	14	19	395	10	10	28	22	6	5	4	85	2	Pi	0		
McCaleb, V D	14	13	15	15	13	350	9	9	21	23	4	2	4	72	27	Pi			
McMurray, C H	16	16	18	16	17	415	10½	9	26	23	7	5	4	84½	5	Ob	0		
Mills, C L	Relieved from instruction November 20, 1918.																		
Moriarty, J J	15	14	11	14	17	350	9	10	19	24	3	4	4	73	25	Pi			
Nordeck, J O	14	14	12	13	12	325	8½	10	21	23	4	4	4	74½	21	Pi			P
Pratt, D L	17	15	17	16	15	400	10	7	24	21	5	5	4	76	18	Pi			P
Roller, R L	16	14	13	10	11	320	8	9	27	24	4	5	3	80	8	Pi		B	
Schmidt, W B	14	12	15	14	17	360	9	9	27	21	5	4	4	79	11	Ob	0		
Scroggins, L V	14	14	13	13	16	345	8½	8	22	23	6	4	4	75½	19	Pi			P
Steichen, R J	14	15	12	16	15	360	9	9	25	22	5	4	4	78	15	Pi			P
Stohl, L J	14	12	14	13	11	320	8	9	29	23	6	4	4	83	6	Pi	0		
Tompkins, J G	11	12	12	12	11	290	7½	8	27	24	7	5	4	82½	7	Pi		B	
Wheeler, C P	16	15	13	13	13	350	9	12½	18	23	4	3	4	73½	24	Pi			P
Wood, A F	13	11	13	13	14	320	8	9	24	18	7	4	4	74	22	Pi			P
Rhinehelt, H A	14	15	12	12	13	330	8½	8	21	23	4	5	3	72½	26	Pi			

Where no assignment is made they are demoted or discharged.

APPENDIX F8

Contains the following:

Copy of Weekly Schedule of Classes for
Week beginning Monday, October 14, 1918. (22 pages)

APPENDIX F3

CLASS Squadron A SECTION First EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00		217 Hil Fill out Record Cards	201 Hil Military Subjects		201 Hil Military Subjects	201 Hil Military Subjects
9:10 to 10:00	125 Hil Military Subjects	Drill	Drill	Drill	Drill	Drill
10:10 to 11:00	Barracks Signalling	Drill	Drill	Drill	Drill	Barracks Signalling
11:10 to 12:15	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	Barracks Signalling	
1:10 to 2:00					125 Hil Military Subjects	
2:10 to 3:00	Drill	125 Hil Military Subjects	201 Hil Military Subjects	Drill	Drill	
3:10 to 4:00	Drill	123 Hil Military Subjects	12 Aero Rigging	Drill	Drill	
4:10 to 5:00	Obtain Material from Tool-room	Barracks Signalling	12 Aero Rigging	Barracks Signalling	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony

2m-11,'18

CLASS Squadron A SECTION Second EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00		217 Hil Fill out Record cards	201 Hil Military Subjects		201 Hil Military Subjects	201 Hil Military Subjects
9:10 to 10:00	125 Hil Military Subjects	Drill	Drill	Drill	Drill	Drill
10:10 to 11:00	Barracks Signalling	Drill	Drill	Drill	Drill	12 Aero Rigging
11:10 to 12:15	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	Barracks Signalling	12 Aero Rigging
1:10 to 2:00					123 Hil Military Subjects	
2:10 to 3:00	Drill	125 Hil Military Subjects	201 Hil Military Subjects	Drill	Drill	
3:10 to 4:00	Drill	123 Hil Military Subjects	Barracks Signalling	Drill	Drill	
4:10 to 5:00	Obtain Material from Tool-room	Barracks Signalling		Barracks Signalling	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron B SECTION First EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	Eng. Test Bldg. Engine Lab.	200 H M Engine Lecture	123 Hil Military Subjects	10 Aero Theory of Flight	10 Aero Rigging	125 Hil Military Subjects
9:10 to 10:00	Eng. Test Bldg. Engine Lab.	123 Hil Military Subjects	Barracks Signalling		10 Aero Engine Lecture	Drill
10:10 to 11:00	123 Hil Military Subjects	12 Aero Rigging	123 Hil Military Subjects		125 Hil Military Subjects	Drill
11:10 to 12:15	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	123 Hil Theory of Flight	Barracks Signalling
1:10 to 2:00						
2:10 to 3:00	12 Aero Rigging	Drill	Drill	Drill	Drill	
3:10 to 4:00	12 Aero Rigging	Drill	Drill	Drill	Drill	
4:10 to 5:00	Barracks Signalling		Barracks Signalling		Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron B SECTION Second EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	Eng. Test Bldg. Engine Lab.	200 H M Engine Lecture	123 Hil Military Subjects	10 Aero Theory of Flight	10 Aero Rigging	125 Hil Military Subjects
9:10 to 10:00	Eng. Test Bldg. Engine Lab.	123 Hil Military Subjects	Barracks Signalling	12 Aero Rigging	10 Aero Engine Lecture	Drill
10:10 to 11:00	123 Hil Military Subjects	12 Aero Rigging	123 Hil Military Subjects	12 Aero Rigging	125 Hil Military Subjects	Drill
11:10 to 12:00 12:15	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	123 Hil Theory of Flight	Barracks Signalling
1:10 to 2:00						
2:10 to 3:00		Drill	Drill	Drill	Drill	
3:10 to 4:00		Drill	Drill	Drill	Drill	
4:10 to 5:00	Barracks Signalling		Barracks Signalling		Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron C SECTION First EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	Barracks Signalling	12 Aero Rigging	3 Aero Machine Guns	123 Hil Military Subjects	Guard &	3 Aero Machine Guns
9:10 to 10:00	12 Aero Rigging	12 Aero Rigging	Drill	Drill	Guard &	12 Aero Rigging
10:10 to 11:00	Eng. Test Bldg. Engine Lab.	3 Aero Machine Guns	Barracks Signalling	200 H M Engine Lecture	Guard Detail	123 Hil Theory of Flight
11:10 to 12:00 12:10	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	Guard & Detail	Eng. Test Bldg. Engine Lecture
1:10 to 2:00					Guard & Detail	
2:10 to 3:00	123 Hil Military Subjects	Eng. Test Bldg. Engine Lab.	10 Aero Rigging		Guard & Detail	
3:10 to 4:00	Eng. Test Bldg. Engine Lab.	Drill	Drill	Barracks Signalling	Guard & Detail	
4:10 to 5:00	Eng. Test Bldg. Engine Lab.	123 Hil Military Subjects	3 Aero Machine Guns	123 Hil Military Subjects	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS D SECTION First EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	Barracks Signalling	13 Aero Eng. Lab.	Guard & Detail	201 Hil Theory of Flight	Barracks Signalling	10 Aero Engine Lecture
9:10 to 10:00	13 Aero Eng. Lab.	13 Aero Engine Lab.	Guard & Detail	10 Aero Engine Lecture	1 Aero Machine Guns	3 Aero Machine Guns
10:10 to 11:00	113 Eng. Prelim. Ex. Airplanes	13 Aero Eng. Lab.	Guard & Detail	123 Hil Military Subjects	1 Aero Machine Guns	Drill
11:10 to 12:00 12:15	Gym. Athletics	Gym. Athletics	Guard & Detail	Gym. Athletics	201 Hil Rigging	Barracks Signalling
1:10 to 2:00			Guard & Detail			
2:10 to 3:00	125 Hil Prelim. Ex. Mil. Subjs.	12 Aero Rigging	Guard & Detail		217 Hil Military Subjects	
3:10 to 4:00	104 H M Rigging	12 Aero Rigging	Guard & Detail	Drill	Drill	
4:10 to 5:00	4 Aero Machine Guns	12 Aero Rigging	Guard & Detail	125 Hil Military Subjects	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11.'18

CLASS Squadron D SECTION Second EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	Barracks Signalling	13 Aero Eng. Lab.	Guard & Detail	201 Hil Theory of Flight	12 Aero Rigging	10 Aero Engine Lecture
9:10 to 10:00	13 Aero Eng. Lab.	13 Aero Eng. Lab.	Guard & Detail	10 Aero Engine Lecture	12 Aero Rigging	3 Aero Machine Guns
10:10 to 11:00	113 Aq. Prelim. Ex. Airplanes	13 Aero Eng. Lab.	Guard & Detail	123 Hil Military Subjects	12 Aero Rigging	Drill
11:10 to 12:00 ~~1:00~~ 12:15	Gym. Athletics	Gym. Athletics	Guard & Detail	Gym. Athletics	201 Hil Rigging	Barracks Signalling
1:10 to 2:00			Guard & Detail			
2:10 to 3:00	125 Hil Prelim. Ex. Mil. Subjs.	Barracks Signalling	Guard & Detail	21 Aero Rigging	217 Hil Military	
3:10 to 4:00		3 Aero. Machine Guns	Guard & Detail	Drill	Drill	
4:10 to 5:00	4 Aero Machine Guns	3 Aero Machine Guns	Guard & Detail	125 Hil Military Subjects	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron E SECTION First EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	Guard & Detail	1 Aero Machine Guns	12 Aero Rigging	1 Obs. Meteorology	123 Hil Military Subjects	113 Ag. Engine Lecture
9:10 to 10:00	Guard & Detail	Barracks Signalling	3 Aero Machine Guns	200 H M Theory of Flight	200 H M Theory of Flight	Drill
10:10 to 11:00	Guard & Detail	123 Hil Military Subjects	3 Aero Machine Guns	125 Hil Military Subjects	201 Hil Military Subjects	Barracks Signalling
11:10 to 12:00	Guard & Detail	Gym. Athletics	Gym. Athletics	Gym. Athletics	Barracks Signalling	200 H M Machine Guns
1:10 to 2:00	Guard & Detail	12 Aero Rigging				
2:10 to 3:00	Guard & Detail		Drill	Drill	12 Aero Rigging	
3:10 to 4:00	Guard & Detail	Eng. Test Bldg. Eng. Lab.	Eng. Test Bldg. Eng. Lab.	113 Ag. Engine Lecture	12 Aero. Rigging	
4:10 to 5:00	Guard & Detail	Eng. Test Bldg. Engine Lab.	Eng. Test Bldg. Engine Lab.	1 Obs. Rigging	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron E SECTION Second EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	Guard & Detail	1 Aero Machine Guns	Barracks Signalling	1 Obs. Meteorology	123 Hil Military Subjects	113 Ag. Engine Lecture
9:10 to 10:00	Guard & Detail	Barracks Signalling	12 Aero Rigging	200 H M Theory of Flight	200 H M Theory of Flight	Drill
10:10 to 11:00	Guard & Detail	123 Hil Military Subjects	12 Aero Rigging	125 Hil Military Subjects	201 Hil Military Subjects	Barracks Signalling
11:10 to ~~12:00~~ 12:15	Guard Detail	Gym. Athletics	Gym. Athletics	Gym. Athletics	12 Aero Rigging	200 H M Machine Guns
1:10 to 2:00	Guard & Detail				12 Aero Rigging	
2:10 to 3:00	Guard & Detail		Drill	Drill	3 Aero Machine Guns	
3:10 to 4:00	Guard & Detail	Eng. Test Bldg. Eng. Lab.	Eng. Test Bldg. Eng. Lab.	113 Ag. Eng. Lect.	3 Aero. Machine Guns	
4:10 to 5:00	Guard & Detail	Eng. Test Bldg. Eng. Lab.	Eng. Test Bldg. Eng. Lab.	1 Obs. Rigging	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron F SECTION All EFFECTIVE 10/14/18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	~~201 Hil~~ Military Subjects	Guard & Detail	2 Aero Signalling	Eng. Test Bldg. Eng. Lab.	3 Aero Machine Guns	
9:10 to 10:00	1 Aero Machine Guns	Guard & Detail	~~123 Hil~~ Repair of Machines	Eng. Test Engine Lab.	201 Hil Meteorology	217 Hil Military Subjects
10:10 to 11:00	Drill	Guard & Detail		Eng. Test Bldg. Engine Lab.	1 Phil Types of Machines	3 Aero Machine Guns
11:10 to 12:15	Gym. Athletics	Guard & Detail	Gym. Athletics	Gym. Athletics	217 Hil Military Subjects	123 Hil Military Subjects
1:10 to 2:00		Guard & Detail				
2:10 to 3:00	10 Aero Eng. Lab.	Guard & Detail	123 Hil Military Subjects	Eng. Test Bldg. Engine Lab.	2 Aero Signalling	
3:10 to 4:00	1 Obs. Prelim. Ex. Engines	Guard & Detail	Drill	Drill	Drill	
4:10 to 5:00	2Aero Signalling	Guard & Detail	10 Aero Types of Engines	3 Aero. Machine Guns	Inspection	
5:10 to 6:00	CEremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron F-X SECTION First EFFECTIVE 10-1[illegible]-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	10 Aero Engine Lecture	123 Hil Military Subjects	10 Aero Types of Machines	2 Aero Signalling	Eng. Test Bldg. Eng. Lab.	
9:10 to 10:00	123 Hil Military Subjects	2 Aero Radio Lecture	2 Aero Radio Lecture	123 Hil Machine Guns	Eng. Test Engine Lab.	113 Ag. Engine Lecture
10:10 to 11:00	21 Aero Repair of Machines	1 Aero Machine Guns	201 Hil Military Subjects	Drill	123 Hil Military Subjects	2 Aero Signalling
11:10 to 12:00 12: 15	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	1 Aero Machine Guns	1 Obs. Instruments
1:10 to 2:00				125 Hil Meteorology		
2:10 to 3:00	Drill	2 Aero Signalling	12 Aero Repair of Machines	1 Obs. Instruments	123 Hil Rigging	
3:10 to 4:00	10 Aero Machine Guns	Drill	Drill	Eng. Test Bldg. Eng. Lab.	Drill	
4:10 to 5:00	3 Aero Machine Guns	21 Aero Rigging	123 Hil Military Subjects	Eng. Test Bldg. Engine Lab.	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron F-X SECTION Second EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	10 Aero Engine Lecture	123 Hil Military Subjects	10 Aero Types of Machines	2 Aero Signalling	Eng. Test Bldg. Engine Lab.	12 Aero Repair of Machines
9:10 to 10:00	123 Hil Military Subjects	2 Aero Radio Lecture	2 Aero Radio Lecture	123 Hil Machine Guns	Eng. Test Bldg. Engine Lab.	113 Eng. Engine Lecture
10:10 to 11:00	21 Aero Repair of Machines	1 Aero Machine Guns	201 Hil Military Subjects	Drill	123 Hil Military Subjects	2 Aero Signalling
11:10 to 12:00	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	1 Aero Machine Guns	1 Obs. Instruments
1:10 to 2:00				125 Hil Meteorology		
2:10 to 3:00	Drill	2 Aero Signalling		1 Obs. Instruments	123 Hil Rigging	
3:10 to 4:00	10 Aero Machine Guns	Drill	Drill	Eng. Test Bldg. Engine Lab.	Drill	
4:10 to 5:00	3 Aero Machine Guns	21 Aero Rigging	123 Hil Military Subjects	Eng. Test Bldg. Eng. Lab.	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron G SECTION First EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	125 Hil Military Subjects	22 Aero Repair of Machines	13 Aero Eng. Lab.		2 Aero Signalling	Guard & Detail
9:10 to 10:00	1 Phil Instruments	22 Aero Repair of Machines	13 Aero Eng. Lab.		123 Hil Military Subjects	Guard & Detail
10:10 to 11:00	201 Hil Military Subjects	22 Aero Repair of Machines	21 Aero Rigging		13 Aero Eng. Lab.	Guard & Detail
11:10 to 12:00 12:15	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	13 Aero Engine Lab.	Guard & Detail
1:10 to 2:00						Guard & Detail
2:10 to 3:00	21 Aero Repair of Machines	1 Aero Machine Guns	2 Aero Signalling	Drill	Drill	Guard & Detail
3:10 to 4:00	4 Aero Machine Guns	125 Hil Military Subjects	1 Obs. Instruments	Drill	Drill	Guard & Detail
4:10 to 5:00	21 Aero Repair of Machines	2 Aero Signalling	1 Aero Machine Guns	1 Aero Machine Guns	Inspection	Guard & Detail
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron G SECTION Second EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	125 Hil Military Subjects	[illegible]	13 Aero Eng. Lab.	22 Aero Repair of Machines	2 Aero Signalling	Guard & Detail
9:10 to 10:00	1 Phil Instruments		13 Aero Engine Lab.	22 Aero Repair of Machines	123 Hil Military Subjects	Guard & Detail
10:10 to 11:00	201 Hil Military Subjects		21 Aero Rigging	22 Aero Repair of Machines	13 Aero Eng. Lab.	Guard & Detail
11:10 to 12:00 12:15	Gym. Athletics	Gym. Athletics	Gym. Athletics	Gym. Athletics	13 Aero Engine Lab.	Guard & Detail
1:10 to 2:00						Guard & Detail
2:10 to 3:00	21 Aero Repair of Machines	1 Aero Machine Guns	2 Aero Signalling	Drill	Drill	Guard & Detail
3:10 to 4:00	4 Aero Machine Guns	125 Hil Military Subjects	1 Obs. Instruments	Drill	Drill	Guard & Detail
4:10 to 5:00	21 Aero Repair of Machines	2 Aero Signalling	1 Aero Machine Guns	1 Aero Machine Guns	Inspection	Guard & Detail
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron H SECTION All EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	4 Aero Machine Guns	212 Wh Exam. in Gunnery	4 Aero Machine Guns	Guard & Detail	4 Aero Machine Guns	2 Aero Signalling
9:10 to 10:00	Drill	3 Aero Machine Guns	201 Hil Military Subjects	Guard & Detail	Drill	10 Aero Eng. Lab.
10:10 to 11:00	2 Aero Signalling	125 Hil Prelim. Ex. Airplanes	125 Hil Prelim. Ex. Engines	Guard & Detail	200 H M Map Reading	10 Aero Eng. Lab.
11:10 to 12:00 12:15	Gym. Athletics	Gym. Athletics	Gym. Athletics	Guard & Detail	1 Obs. Military Subjects	10 Aero Eng. Lab.
1:10 to 2:00				Guard & Detail	Gym. Turn in Athletic Equipment	
2:10 to 3:00	200 H M Map Reading	200 H M Map Reading	200 H M Map Reading	Guard & Detail	10 Aero Engine Lab.	
3:10 to 4:00	125 Hil Prelim. Ex. Military Subjects	Drill	2 Aero Signalling	Guard & Detail	10 Aero Eng. Lab.	
4:10 to 5:00	125 Hil Military Subjects	125 Hil Military Subjects	4 Aero Machine Guns	Guard & Detail	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron I SECTION All EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	2 Aero Signalling	113 Ag. Coop with Artillery	21 Aero Ri ging	4 Aero Machine Guns	217 Hil Military Subjects	4 Aero Machine Guns
9:10 to 10:00	10 Aero Trap Shooting	113 Ag. Map Redding (Pho ograph)	200 H M Map Reading	4 Aero Machine Guns	2 Aero Signalling	200 H M Map Reading
10:10 to 11:00	1 Aero Trap Shooting	Drill	13 Aero Eng. Lab.	1 Obs. Map Reading (Photography)	10 Aero Eng. Lab.	125 Hil Military Subjects
11:10 to 12:00	Trap Shooting		13 Aero Eng. Lab.		10Aero Eng. Lab.	Drill
1:10 to 2:00						
2:10 to 3:00	4 Aero Machine Guns	Drill	217 Hil Coop. with Artillery	123 Hil Military Subjects	113 Ag. Coop. with Artillery	
3:10 to 4:00	Drill	Drill	4 Aero Machine Guns	1 Aero Trap Shooting	Hike & Bath	
4:10 to 5:00	123 Hil Military Subjects		2 Aero Signalling	Trap Shooting	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY

CLASS Squadron K SECTION First EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	123 Hil Military Subjects	11 Aero Miniature Range	125 Hil Exam. in Military Subjects	11 Aero Miniature Range	11 Aero Miniature Range	Hike & Bath
9:10 to 10:00	201 Hil Miniature Range	1 Phil Military Subjects	125 Hil Exam. in Military Subjects	2 Aero Signalling	125 Hil Coop. with Artillery	2 Aero Signalling
10:10 to 11:00	Drill	Drill	Drill	4 Aero Machine Guns	1 Aero Trap Shooting	11 Aero Miniature Range
11:10 to 12:00	12Aero Repair of Machines		11 Aero Miniature Range		Trap Shooting	4 Aero Machine Guns
1:10 to 2:00						
2:10 to 3:00	201 Hil Military Subjects	201 Hil Military Subjects	4 Aero Machine Guns	4 Aero Machine Guns	Drill	
3:10 to 4:00	1 Aero Trap Shooting	2 Aero Signalling	200 H M Map Reading	22 Aero Repair of Machines	4 Aero Machine Guns	
4:10 to 5:00	Trap Shooting	200 H M Map Reading	201 Hil Coop. with Artillery	22Aero epair of Machines	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron K SECTION Second EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	123 Hil Military Subjects	11 Aero Min. Range	125 Hil Exam. in Military Subjects	11 Aero Min. Range	11 Aero Min. Range	22 Aero Repair of Machines
9:10 to 10:00	201 Hil Miniature Range	1 Phil Military Subjects	125 Hil Exam. in Military Subjects	2 Aero Signalling	125 Hil Coop. with Artillery	22 Aero Repair of Machines
10:10 to 11:00	Drill	Drill	Drill	4 Aero Machine Guns	1 Aero Trap Shooting	11 Aero Miniature Range
11:10 to 12:00	12 Aero Repair of Machines		11 Aero Min. Range		Trap Shooting	4 Aero Machine Guns
1:10 to 2:00						
2:10 to 3:00	201 Hil Military Subjects	201 Hil Military Subjects	4 Aero Machine Guns	4 Aero Machine Guns	Drill	
3:10 to 4:00	1 Aero Trap Shooting	2 Aero Signalling	200 H M Map Reading	2 Aero Signalling	4 Aero Machine Guns	
4:10 to 5:00	Trap Shooting	200 H M Map Reading	201 Hil Coop. with Artillery	Hike & Bath	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron L SECTION First EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	21 Aero Repair of Machines	125 Hil Examin. in Airplanes	11 Aero Min. Range	1 Aero Machine Guns	1 Aero Trap Shooting	11 Aero Min. Range
9:10 to 10:00	Drill	125 Hil Exam. in Airplanes	4 Aero Machine Guns	11 Aero Min. Range	Trap Shooting	4 Aero Machine Guns
10:10 to 11:00	11 Aero Min. Range	11 Aero Min. Range	113 Ag. Exam. in Gunnery	10 Aero Machine Guns	2 Aero Signalling	Drill
11:10 to 12:00	2 Aero Signalling		2 Aero Signalling		11 Aero Min. Range	Drill
1:10 to 2:00		Eng. Test Bldg. Engine Lab.	Eng. Test Bldg. Engine Lab.	Eng. Test Bldg. Eng. Lab.		
2:10 to 3:00	3 Aero Machine Guns	Eng. Test Bldg. Engine Lab.	Eng. Test Bldg. Engine Lab.	Eng. Test Bldg. Engine Lab.	4 Aero Machine Guns	
3:10 to 4:00	200 H M Map Reading	1 Aero Trap Shooting	Drill	200 H M Map Reading	200 H M Map Reading	
4:10 to 5:00	12 Aero Repair of Machines	Trap Shooting	200 H M Map Reading	Hike & Bath	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron L SECTION Second EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	21 Aero Repair of Machines	125 Hil Exam. in Airplanes	11 Aero Min. Range	1 Aero Machine Guns	1 Aero Trap Shooting	1 Aero Machine Guns
9:10 to 10:00	Drill	125 Hil Exam. in Airplanes	4 Aero Machine Guns	11 Aero Min. Range	Trap Shooting	11 Aero Min. Range
10:10 to 11:00	11 Aero Min. Range	11 Aero Min. Range	113 Ag. Exam. in Gunnery	10 Aero Machine Guns	2 Aero Signalling	Drill
11:10 to 12:00	2 Aero Signalling		2 Aero Signalling		11 Aero Min. Range	Drill
1:10 to 2:00		Eng. Test Bldg. Engine Lab.	Eng. Test Bldg. Eng. Lab.	Eng. Test Bldg. Engine Lab.		
2:10 to 3:00	3Aero Machine Guns	Eng. Test Bldg. Eng. Lab.	Eng. Test Bldg. Eng. Lab.	Eng. Test Bldg. Eng. Lab.	4 Aero Machine Guns	
3:10 to 4:00	200 H M Map Reading	1 Aero Trap Shooting	Drill	200 H M Map Reading	200 H M Map Reading	
4:10 to 5:00	12 Aero Repair of Machines	Trap Shooting	200 H M Map Reading	Hike & Bath	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron M SECTION First EFFECTIVE 1-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	11 Aero Min. Range	4 Aero Machine Guns	113 Ag. Exam. in Engines	113 Ag. Exam. in Observation		
9:10 to 10:00	4 Aero Machine Guns	200 H M Map Reading	113 Ag. Exam. in Engines	113 Ag. Exam. in Observation	Drill	
10:10 to 11:00	Eng. Test Bldg. Eng. Lab.	200 H M Map Reading	1 Aero Trap Shooting	2 Aero Signalling	Return Material to Tool-room	
11:10 to 12:00	Eng. Test Bldg. Eng. Lab.		Trap Shooting			
1:10 to 2:00	Eng. Test Bldg. Engine Lab.	2 Aero Signalling		Barracks Exam. in Signalling		
2:10 to 3:00	Eng. Test Bldg. Eng. Lab.	4 Aero Machine Guns	125 Hil Exam. in Gunnery	Barracks Exam. in Signalling	Drill	
3:10 to 4:00	2 Aero Signalling	11 Aero Min. Range	125 Hil Exam. in Gunnery	11 Aero Min. Range Test	Hike & Drill	
4:10 to 5:00				11 Aero Min. Range Test	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

CLASS Squadron M SECTION Second EFFECTIVE 10-14-18

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
8:10 to 9:00	3 Aero Machine Guns	4 Aero Machine Guns	113 Ag. Exam. in Engines	113 Ag. Exam. in Observation		
9:10 to 10:00		200 H M Map Reading	113 Ag. Exam. in Engines	113 Ag. Exam. in Observation	Drill	
10:10 to 11:00	Eng. Test Bldg. Eng. Lab.	200 H M Map Reading	1 Aero Trap Shooting	2 Aero Signalling		
11:10 to 12:00	Eng. Test Bldg. Engine Lab.		Trap Shooting		Return Material to Tool-room	
1:10 to 2:00	Eng. Test Bldg. Engine Lab.	20 Aero Signalling		11 Aero Miniature in Range Test		
2:10 to 3:00	Eng. Test Bldg. Eng. Lab.	11Aero Min. Range	125 Hil Exam. in Gunnery	11 Aero Miniature Range Test	Drill	
3:10 to 4:00	2 Aero Signalling	4 Aero Machine Guns	125 Hil Exam. in Gunnery	Barracks Exam. in Signalling	Hike & Bath	
4:10 to 5:00	11 Aero Machine Guns			Barracks Exam. in Signalling	Inspection	
5:10 to 6:00	Ceremony	Ceremony	Ceremony	Ceremony	Ceremony	

2m-11,'18

APPENDIX II

Contains the following:

Alphabetical List of Instructors Who Served
In the School- by departments with data on period
Of Service, Status, Education and Previous Experience
(10 pages)

SCHOOL OF MILITARY AERONAUTICS -- BERKELEY

Staff Personnel -- Military Subjects Department.

NAME	DATE OF APPOINTMENT	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
1. Alford, L.	1/7/18	Civilian	Student-Univ. of Cal.	8/26/18	Resigned
2. Atcheson, G.	7/30/18	Enlisted - Private 218 Aero Squadron	Student-Univ.of Cal.	1/10/19	Closing of S.M.A.
3. Campbell, M.	10/12/17	Civilian-Com. 2nd Lt. A.S.S.C. 4/1/18	Student-Univ.of Cal.	10/5/18	Transferred to Mather Field
4. Carr, E.C.	3/19/18	Enl.-Sgt. 1st Class 818th Aero Squadron	Clerk	1/6/19	Closing of S.M.A.
5. Clark, M.R.	6/5/17	Civilian	Student	8/18/17	Resigned
6. Edwards, Jesse	1/28/18	Lst. Lt. M.C.(Gas Defense)	Surgeon	1/20/19	Closing of S.M.A.
7. Gibson, H.E.	5/28/17	Civilian	Student	8/13/17	Resigned
8. Gordon, C.R.	6/12/17	Civilian	Student	8/15/17	Resigned
9. Gough, Robert S.	1/26/18	1st. Lt. M.C.(Gas Defense)	Surgeon	2/1/19	Closing of S.M.A.
10. Hardison, L.M.	1/2/18	Civilian	Student-Univ.of Cal.	8/31/18	Resigned
11. Harrison, T.A.	5/22/17	Civilian	A.B. 1917-Law	6/18/17	Resigned
12. Harvey, S. B.	6/25/18	Civilian	Student-Univ.of Cal. 2nd Lt. U. S. A. C.	11/30/18	Closing of S.M.A.
13. Heffner, R.J.	6/23/17	Civilian-Com. 1st Lt. A.S.S.C. 9/28/17-Head of Dept. until 6/11/18-Also gave instruction in Obs. Dept.	Eng. Graduate University of Calif.	6/11/18	Transferred
14. Hooper, L.C.	4/29/18	Civilian	Student-Univ.of Cal.	10/9/18	Resigned
15. Kingsbury, E.L.	10/10/17	Civilian	Student	11/12/17	Resigned
16. Mathews, F.C.L.	1/2/18	Com.-Head of Dept. from 6/11/18 to close of school	High School Principal-Teacher of Chem.	1/9/19	Closing of S.M.A.
17. Mitchell, C.G.	6/25/17	Civilian	Student-Univ. of Cal.	7/8/18	Resigned
18. Moses, J.C.	6/25/17	Civilian	Student-Univ.of Cal.	11/17/17	Resigned
19. Nickerson, R.	12/12/17	Civilian	Student-Univ.of Cal.	11/7/18	Resigned
20. O'Sullivan, Capt. C.D.	10/15/17	Commissioned (Lectures in Military Subjects)	Ass't. Commandant of Cadets, Univ. of Cal.	12/8/17	Transferred
21. Pillsbury, W.S.	5/22/17	Civilian-Com. 1st Lt. A. S. S. C.	Student-Univ.of Cal.	3/23/18	Transferred
22. Pitts, J.	1/7/18	Civilian	Student-Univ.of Cal.	8/22/18	Resigned
23. Prince, F.M.	6/6/18	Civilian-Inducted 8/1/18	A.B. 1917-Law Member of Calif. Bar	2/1/19	Closing of S.M.A.

Military Subjects Department.

NAME	DATE OF APPTMENT	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
24. Ramsey, J. A.	11/15/17	Civilian	Student-Univ. of Cal.	12/22/17	Resigned
25. Reed, H. B.	5/22/17	Civilian - Enlisted Com. 1st Lt. A.S.S.C.	A.B. 1918 - Lit. Arts	9/15/18	Transferred
26. Sandow, Capt. B. F.	7/31.17	Com.(Loctures in Hygiene,etc)	Post Surgeon	2/1/19	Closing of S.M.A.
27.Schilling,K.M.	4/10/18	Civilian	A.B. 1917 - Geology	4/30/18	Drafted
28.Smith,A.G.	7/3/17	Civilian - Enl. S.E.R.C. 12/14/17 - Com. 2nd Lt. A. S.S.C. (Also gave instr. in Observation Dept.)	Eng. Graduate, University of Calif.	10/1/18	Transformed-Radio Sch.
29.Steen, E. F.	5/22/17	Civilian - Com. 2nd Lt. A. S. A. 8/27/18	A.B. 1918 - Lit.Arts	1/4/19	Closing of S.M.A.
30.Wheeler,J.D.	1/21/18	Civilian	Student-Univ.of Cal.	8/17/18	Resigned
31.White, L. M.	8/22/17	Civilian - Inducted Pvt.Sgt.,Com. 2nd Lt. A. S. A. 9/5/18	Student-Univ. of Cal.	2/1/19	Closing of S.M.A.
32.Williams, E.A.	4/30/18	Civilian	Student-Univ. of Cal.	11/30/18	Closing of S.M.A.



SCHOOL OF MILITARY AERONAUTICS -- BERKELEY

Staff Personnel -- Signalling Department.

NAME	DATE OF APPOINTMENT	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
1. Cattell, G.M.	2/11/18	Civilian	Graduate of U. of C.	7/31/18	Resigned
2. Conlin, F.J.	10/3/17	Civilian - Enl. S.E.R.C. 12/14/17	Radio Mechanic	3/15/18	Resigned
3. Crossley, J.W.	7/13/18	Civilian -Also gave instruction in Obs. Dept.	Graduate of Marconi Radio School - S. F.	11/30/18	Transferred to Observation Dept.
4. Fielder, H.	7/1/17	Civilian	U. of C. Three years Radio Laboratory U.S.N. two years.	6/8/18	To take S. M. A. course
5. Fonseca, A.	8/1/17	Civilian	Radio Operator	12/7/18	Closing of S. M. A.
6. Gerlach, L.J.	7/1/18	Private	Radio Operator	2/1/19	Closing of S. M. A.
7. Hall, I.A.	1/7/18	Civilian	1 year U. Of C. Radio Mechanic	11/30/18	Closing of S. M. A.
8. McEachern, M.M.	10/22/17	Civilian-Enl.S.E.R.C. 12/14/17	Radio Operator	11/30/18	Closing of S. M. A.
9. McPherson, F.B.	5/28/17	Civilian - Com. 1st Lt. A.S.S.C. 9/24/17	1 year U. of Nevada 7 yrs. Elect. Eng. Radio Lab. Mare Island: California.	1/28/19	Closing of S. M. A.
10. Miche, J. A.	7/1/18	Civilian	Graduate Marconi Radio School, S. F.	12/14/18	Closing of S. M. A.
11. Mundt, C. S.	5/13/18	Civilian	Graduate of U. of C.	11/30/18	Closing of S. M. A.
12. Perkins, E.F.	8/20/17	Civilian - Pvt. - Sgt. Com. 2nd Lt. A.S.A. 8/21/18	2½ years U. of C. Elect. Eng. 8 years	12/31/18	Closing of S. M. A.
13. Silont, H. M.	2/1/18	Civilian	2½ yrs. U. of C. -Am. Radio	11/30/18	Closing of S. M. A.
14. Street, C.	2/28/18	Civilian	Radio Operator	12/7/18	Closing of S. M. A.



Staff Personnel -- Cookery Department

I. [illegible]	6/1/15	[illegible] entered U.S. Army (Ord. Dept.) as			
			Clerk - Typist		Transferred to
			[illegible] Quartermaster Corps	2/1/18	Civil Pst. Serv. 1
2. [illegible]	1/1918	[illegible]			
		12/16/17 - [illegible]	[illegible]		
		[illegible] 9/12/18	8 Creators.	1/1/19	Closing of S. C. A.
3. [illegible]	1/20/18	[illegible]	[illegible] Standard Oil		
			[illegible] Engineer	12/1/18	Closing of S. C. A.
4. [illegible]	11/22/17	[illegible]			
		12/15/17	[illegible] of relieved	12/1/18	Closing of S. C. A.
5. [illegible]	1/15/18	[illegible] Transferred	Secretary of U. S. In-		
		[illegible] - Corporal	str. at Instructors'		To take S. C. A.
			Level	5/26/18	course.
6. [illegible]	1/5/18	[illegible]	Graduate U. of I. In-		
			structor in Mechanical	6/28/18	returned
7. [illegible]	3/1/17	[illegible]	Secretary of Univ. of		
		12/24/17	Illinois Training	12/1/18	Closing of S. C. A.
8. [illegible]	1/16/18	[illegible]	Grad. of U. of C. Academy	5/25/18	To take S. C. A. course
9. [illegible]	2/6/18	[illegible] - Com. Let. Lt.			
		4. 8/1/18 Dept. of Supt.	Sec. in Graduate School		
		[illegible] to close of month	Engineering	2/1/19	Closing of S. C. A.
10. [illegible]	8/1/18	[illegible]	[illegible] Chemist		
			Testing Department	11-30-18	Closing of S. C. A.
11. [illegible]	12/1/17	[illegible] Private, Company - [illegible]			
		Quartermaster in Charge	Student (Architecture)		
		Department	Univ. of California	5/31/18	To take S. C. A. course
12. [illegible]	12/8/17	[illegible]	Graduate of U. of M.		
			(Pi-Ch.) Teaching -		
			Oral Lecture Method	11/3/18	Closing of S. C. A.
13. [illegible]	3/22/18	Private - [illegible]	Graduate Engineer		
		Sergeant - [illegible]	Mechanical Engineer	1/27/19	Closing of S. C. A.
14. [illegible]	3/17/18	Sergeant	Asst. Dietary Advisor at		
			Arlington Field -		
			Structural steel(con-		
			struction)	2/1/19	Closing of S. C. A.
15. [illegible]	1/21/18	[illegible]	Student U. of I. Agricul-	6/1/18	To take S. C. A. course
16. [illegible]	11/12/17	[illegible]	Graduate Univ. of Ga.		
			Department	11/30/18	Closing of S. C. A.

NAME	DATE OF APPOINTMENT	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
17. Jones,L.F.	5/3/17	Civilian until Com. 1st Lt.A.S.S.C. 9/28/17-Head of Dept.until transferred	Ph.D.Physics U. of C. Instructor in Physics Under Com.to Toronto	4/8/18	Transferred to Washington
18. Kinnear,J.A.	1/28/18	Civilian	Student of U.C. 3 yrs	2/23/18	To take S.M.A.course
19. Kirk,A.C.	1/7/18	Civilian	Student(Agric) U. of C.	2/23/18	To take S.M.A.course
20. Knudsen,C.M.	9/10/17	Civilian-Ens.U.S.N.R.C 12/14/17	Physics Instructor	12/7/18	Closing of S.M.A.
21. Lantz, L.S.	3/4/18	Civilian	Grad. Univ. of C.(Ag.) Orchardist	3/11/18	To take S.M.A.course
22. Lingle,W.W.	12/10/17	Civilian - Ens. U.S.N.R.C. 12/14/17	Graduate U. C. (Elect) Electrical Operator	9/25/18	Transferred to Coast Artillery School.
23. Longhurst,M	1/7/18	Civilian	Rancher	4/1/18	Resigned
24. Lovett,C.	1/14/18	Civilian	Graduate U.C.-Production Dept. Cadillac Motor Co.	3/11/18	To take S.M.A.course
25. Mayer, H.	8/20/17	Civilian	Univ. Graduate	10/24/18	Resigned
26. McDonald,E.R.	6/11/17	Civilian-Head of Dept. from 4/15/18 to 6/10/18	Graduate U. of C.1909 Elect.&Mech.Engineering	6/10/18	Resigned
27. Morris,F.R.	6/18/17	Civilian	Instr.Math. Univ.of C.	9/30/18	Resigned
28. Moulton,T.T.	12/17/17	Civilian	Electrical Work	10/12/18	Discharged
29. Nelson,W.H.	4/20/18	Corporal	Graduate Univ.of Wisconsin-Instr. of Manual Arts.	2/1/19	Closing of S.M.A.
30. Phillips,C.	10/29/17 3/5/18	Civilian-Pvt-Sgt.	Graduate of U. of C. Technical) Clerical (Wells Fargo)	11/20/17: 2/1/19	Closing of S.M.A.
31. Russell,R.	6/4/17	Civilian	Graduate of U. of C. Instr. in Physics,U.C.	7/12/17	To take S.M.A.course
32. Skinner,E.L.	6/17/18	Civilian	Graduate Univ. of Chicago, Lawyer.	10/19/18	Discharged
33. Sproul, W.A.	2/25/18	Civilian	Student-U. of C. 2 yrs	3/15/18	To take S.M.A.course
34. Stafford,J.R.	3/22/18	Sergeant	Gunnery course, Illington Fld.Auto Salesman	8/24/18	To take S.M.A.course
35. Stockton,F.S.	6/11/17 7/8/18	Civilian	Instructor	9/3/17 8/10/18	Resigned
36. Teachworth,F.	9/3/18	Private	Instructor in Gunnery Taliaferro Field	2/1/19	Closing of S.M.A.
37. Thomas,C.C.	10/15/17	Civilian	Civil Eng (Assoc.Il Co)	2/10/18	Resigned
38. Thomas, H.C.	9/17/17	Civilian	Grad. U.ofC. Rancher	2/9/18	Resigned
39. Warth, I.C.	5/29/18	Private	Instr. S.M.A. Atlanta Ignition Mechanic	1/8/19	Closing of S.M.A.
40. Weston,W.I	5/25/18	Civilian	Instr.S.M.A.Atlanta,Ga	12/14/18	Closing of S.M.A.

SCHOOL OF MILITARY AERONAUTICS -- BERKELEY

Staff Personnel -- Airplanes Department

NAME	DATE OF APPOINTMENT	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
1. Baker, A.W.	3/15/18	Private - Corp.	Student - 3yrs.College	2/1/19	Closing of S.M.A.
2. Ball, J.F.	3/15/17	Civilian	U.C.'13 - Designing & Constructing Engineer	8/1/18	Resigned
3. Bradbeer, C.B.	3/23/18	Civilian	Ass't.Com.Army & Navy School, San Diego, Calif	12/31/18	Closing of S.M.A.
4. Carlson, F.H.	6/17/18	Civilian	U.C.'15 - Lawyer	11/30/18	Closing of S.M.A.
5. Coke, S.D.	5/11/18	Civilian	Chemical Engineer	7/6/18	To take S.M.A.course
6. Ellis, J.W.	4/8/18	Civilian-Inducted 5/25/18	U.C.'15 - Engineer	2/1/19	Closing of S.M.A.
7. Erickson, C.J.	11/19/17	Civilian	U.C.'15 - Engineer	1/10/19	Closing of S.M.A.
8. Frazier, D.J.	11/1/17	Private, Corporal, Also Instructed in Machine Guns		8/24/18	To take S.M.A.course
9. Jeffers, F.M.	6/14/17	Sec'd'as to Flight Dept.	Instructor-Univ.of Cal	11/30/18	Closing of S.M.A.
10. McLean, H.L.	8/6/17	Civilian-Ens.S.R.C. 12/14/17-Com.2nd Lt.A.S.S.C. 4/11/18-Head of Dept.	Eng. Graduate U. of C. '15-Engineer	2/1/19	Closing of S.M.A.
11. Merrick, C.B.	3/17/18	Civilian	U.C.'14-Journalist-Eng	12/7/18	Closing of S.M.A.
12. Mittenberg, F.	12/17/17	M.S.E.	Air Service, Reg.Army	2/1/19	Closing of S.M.A.
13. Saunders, L.F.	6/10/18	Civilian	Airplane Builder	10/10/18	Resigned
14. Tatnall, A.J.	1/23/18	Civilian	B.S. in Mech.'16 Stanford-Engineer	4/29/18	Resigned
15. Waterman, W.D.	6/11/17	Civilian	Airplane Builder	10/31/17	Discharged
16. Wells, G. F.	1/7/18	Civilian	U.S.'15-Engineer	11/30/18	Closing of S.M.A.
17. Woodruff, L.C.	12/3/17	Corp.Sgt.,Sgt.1st Class Com.1st Lt.A.S.A. 3/20/18	U.C.'16-Engineer	1/13/19	Closing of S.M.A.
18. Woodruff, L.T.	6/13/18	Civilian	Student	9/30/18	Resigned

SCHOOL OF MILITARY AERONAUTICS -- BERKELEY

Staff Personnel -- Engine Department

NAME	DATE OF APPOINTMENT	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
1. Bachman, F.E.	12/4/17	Civilian-Enl.S.E.F.R.C. 12/14/17	Engine & Car Sampling: Mercer Agency	11/30/18	Closing of S.M.A.
2. Bacon, J.B.F.	1/28/18	Civilian-Inducted 4/11/18:	Eng. Grad. Sheffield Tech. Testing Packard (Detroit)	2/1/19	Closing of S.M.A.
3. Barnhill, W.J.	10/1/17	Civilian-Enl.S.E.F.R.C. 12/14/17	Chemical Eng. Grad.	6/1/18	Resigned
4. Chapman, C.R.	9/10/18	Civilian	Extensive Auto. Exper: Shop and road	11/30/18	Closing of S.M.A.
5. Conant, D.J.	7/1/17	Civilian-Enl.S.E.F.R.C. 12/14/17-Com. 2nd Lt.A.S.S.C. 3/19/18, Head of Dept.	Eng. Grad. Stanford U: Mech. Eng. Design	2/1/19	Closing of S.M.A.
6. Crow, H. I.	8/6/17	Civilian-Enl.S.E.F.R.C. 12 14/17	Eng. Grad. U. C. Draft ing Auto. Factory	4/1/18	Resigned
7. Currier, M.L.	11/1/18	Civilian	Technical Education Auto. Shop Experience:	11/30/18	Closing of S.M.A.
8. Evans, L.S.	11/12/17	Civilian	Eng. Grad. Stanford	10/15/18	Resigned
9. Pagcol, C.H.	5/2/18	Civilian-Inducted 5/10/18:	Practical Eng. Exper.:	11/4/18	Transf. to Flying Field
10. Fore, H.A.	4/29/18	Civilian-Inducted 5/16/18:	Eng. Grad. Stanford 2 yrs. Teaching Physics;	2/1/19	Closing of S.M.A.
11. Gaidzik, C.W.	5/13/18	Civilian	Tech. Training-Auto Exp:	11/30/18	Closing of S.M.A.
12. Gaskell, G.L	3/23/18	Civilian	Motor Export	4/1/18	Resigned
13. Hewitt, [illegible]	9/[illegible]/18	Civilian	Practical Eng. Exper.:	9/15/18	Resigned
14. Hill, F.L.	8/1/17	Civilian	Tech. Training-U. of C:	11/1/17	Resigned
15. Holmes, [illegible]	9/17/18	Civilian-Inducted 9/27/18:	Grad. U.C. Practical Eng. Experience	1/10/19	Closing of S.M.A.
16. Hozier, R.H.	1/14/18	Civilian	Technical Training Practical Eng. Exp.	11/30/18	Closing of S.M.A.
17. Irvine, J.	11/1/17	Civilian	Eng. Graduate Stanford, 1 yr. Peak Eng. Company, Oakland	11/16/18	Resigned
18. Macfarlane, D.B.	7/1/17	Civilian	Eng. Graduate, Teaching Experience	10/8/17	Resigned
19. Moots, L.L.	6/25/18	Civilian	Eng. Graduate, Teaching Experience	8/31/18	Resigned
20. Peyton, L.I.	7/29/18	Civilian	Practical Eng. Exper.:	2/1/19	Closing of S.M.A.

Engine Department

NAME	DATE OF ENTRY	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
21. Price, T.	10/15/17	Civilian	Technical Training Aero Eng. Drafting	2/1/19	Closing of S.M.A.
22. Laber, B.F.	5/3/17	Civilian - In charge of Dept. Advisory Member Ac Bd. Member of Committee to Toronto	Prof. of Mechanical Eng.	12/31/18	Closing of S.M.A.
23. Schluze, L.H.	5/20/18	Civilian	Eng. Graduate U. of C.	11/30/18	Closing of S.M.A.
24. Snead, S.	11/5/17	Civilian	Practical Eng. Exper.	11/20/17	Discharged
25. Sulik, .	11/5/17	Civilian	Practical Eng. Exper.	1/3/18	Discharged
26. Yard, M.F.	2/18/18	Civilian	Practical Eng. Exper.	11/30/18	Closing of S.M.A.
27. White, W.A.	11/21/17	Civilian-Enl.S.R.M.C.			
		12/14/17	Eng. Grad. U. of C.	12/31/19	Closing of S.M.A.
28. Williams, I.A.	2/1/18	Civilian	Practical Eng. Exper.	2/13/18	Discharged
29. Winters, V.L.	12/3/17	Civilian-Enl.S.R.M.C.			
		12/14/17-Com. 2nd Lt., A.S.A. 8/20/18	Eng. Grad. Stanford Practical Experience	12/19/18	

SCHOOL OF MILITARY AERONAUTICS — BERKELEY

Staff Personnel — Observation Department.

NAME	DATE OF APPOINT	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
1.Alexander,T.A.	5/13/18	Civilian	Civil Eng. Grad.-Civil Eng. Constr. Work	11/30/18	Closing of S.M.A.
2.Browning,S.D.	5/24/18	Civilian	Elec. Eng. Grad.-Elec. Eng. Constr. Work	10/5/18	Resigned
3.Clark, L.B.	10/15/17	Civilian-Enl.S.E.R.C. 12/14/17	Skilled Mechanic	11/30/18	Closing of S.M.A.
4.Cloud,R.C.	2/18/18	Civilian	Elec. Eng. Grad. Elec.Sales Work	12/14/18	Closing of S.M.A.
5.Crossley,J.M.	7/18/18	Civilian-Also gave Instr. in Signalling Dept.	Expert Wireless Operator	11/30/18	Closing of S.M.A.
6.Dodge,J.F.	11/1/18	Civilian	Technical Graduate High School Teacher	12/14/18	Closing of S.M.A.
7.D'Ogly, E.M.	6/4/17	Civilian-Head of Dept. until 4/3/18	Elec.Eng. Graduate and Elect. Constr, work.	4/3/18	Resigned
8.Heffner,R. J.	6/23/17	See Mil. Sub. Depts. Gave Instr. in Maps & Recon.	See Mil. Sub. Dept.	6/11/18	Transferred
9.Hendricks,J.A.	10/21/18	Civilian	Mining Eng. Graduate Mining work	1/15/19	Closing of S.M.A.
10.Ingram,S.M.	2/14/18	Civilian	Mining Eng. Graduate Mining work	4/14/18	Resigned
11.Jeffers,W.F.	6/4/17	Civilian-Enl.S.E.R.C. 12/14/17-Also in Aids to Flight.	Instructor in Astronomy, Univ. of Calif.	11/30/18	Closing of S.M.A.
12.Maher,J.D.	2/14/18 7/27/18	Private, (Also in Aids to Flight	Commercial Photographic work at a factory	4/12/18 2/1/19	Transferred
13. Meades, R.S.	1/14/18	Civilian-Com.2nd Lt.A. S.A. 9/10/18 (Also in Aids to Flight)	Graduate U.C. in Geology,-Oil expert	12/20/18	Closing of S.M.A.
14.Smith, A.G.	7/9/17	See Mil. Subjects Dept. Gave Instr.in Maps &Recon	Engineering Grad. Univ. of California.	10/2/18	Transferred
15.Thomas, C.M.	8/6/17	See Aids to Flight Dept: Instr. in Maps	Eng. Graduate-Univ. of Texas. Electrical Engr.	2/1/19	Closing of S.M.A.
16.Waite, R. A.	11/9/17	Civilian-Enl.S.E.R.C. 12/14/17-Com.1st Lt.A. S.A. 9/29/18-Head of Dept.From 4/3/18 to close of school	Elec. Eng. Graduate Elec. Eng. Work at Factory	2/1/19	Closing of S.M.A.

SCHOOL OF MILITARY AERONAUTICS -- [illegible]

Staff Personnel -- Aids to Flight Department

NAME	DATE OF APPOINTMENT	STATUS	PREVIOUS EXPERIENCE	DATE OF LEAVING	CAUSE OF LEAVING
1. Jeffers, H.M.	6/14/17	Civilian-Ind.S.E.R.C. 12/14/17-Also in Obs. Dept.	Instructor, University of California	11/30/18	Closing of S.M. A.
2. Leber, J.D.	2/14/17 7/27/18	Private -(Also in Obs. Department).	See Observation Dept.	4/12/18 2/1/19	Closing of S.M.A.
3. Fillsbury, L.S.	5/22/17	See Mil. Sub. Dept. Lectures in C.C. Flying	See Mil. Sub. Dept.	3/23/18	Transferred
4. Polhemus, J.A.	6/18/17	Civilian-Head of C.C. & Gen. Flying-Head of Aids to Flight until 12/14/17	Engineer Graduate University of Calif.	12/14/17	Resigned
5. Reed, H.B.	5/22/17	See Mil. Sub. Dept.	See Mil. Sub. Dept.	9/3/18	Transferred
6. Rhoades, R.S.	1/14/18	See Observation Dept.	See Observation Dept.	12/26/18	Closing of S.M.A.
7. Thomas, G.M	6/6/17	Civilian-Ind.S.E.R.C. 12/14/17-Head of Dept. fr m 12/14/17-V.P. Ac.Bd. Com. 1st Lt.A.S.A. 9/11/18;	Eng. Grad. Univ. of Texas-Elect. Eng.	2/1/19	Closing of S.M.A.

APPENDIX K1

Contains the following:

Copies of Syllabi of MILITARY SUBJECTS DEPARTMENT
Furnished to Cadets on:

Administration and Organization of the U.S. Army (20 pages
Military Courtesy (9 pages)
Guard Duty (12 pages)
Questions and Answers on Guard Duty (2 pages)
Military Hygiene, Sanitation and First Aid (7 pages)
Articles of War (14 pages)
Military Law (17 pages)
Trench Warfare-(17 pages)
Gas Warfare -- (14 pages)
Modern Foreign Armies (9 pages)
Instructions to Cadets (3 pages)
General Order No. 1. (1 page)
General Order No. 2. (1 page)
Personal Equipment Suggested to Be Taken to France (4 pages)
Army Paper Work and Squadron Administration:
- Sources of Information (6 pages)
- Military Correspondence (7 pages)
- The Military Letter (3 pages)
- Forms for Enlisted Man and Officer (11 pages)
- Organization of Military Office (13 pages)
- Public Property (8 pages)
- Disbursing of Public Funds (8 pages)

Rank, Grade, Uniform and Insignia (11 pages)
Army Regulations (17 pages)
Infantry Drill Regulations (5 pages)

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MILITARY SUBJECTS DEPARTMENT

NOTES ON ADMINISTRATION AND ORGANIZATION OF THE UNITED STATES ARMY

These notes contain CONFIDENTIAL INFORMATION and are furnished for the use of Officers, Instructors and Students of the School of Military Aeronautics and authorized persons in the employ of the Government ONLY.

I. THE PRESIDENT OF THE UNITED STATES

a. Powers

1. Appointment of officers

2. Federalization of the National Guard

3. Call for Volunteers

b. Connection with the Secretary of War

II. THE SECRETARY OF WAR

a. Appointment by the President

b. Representative of the President

c. Duties of the Secretary of War

d. Exercise of control thru the Chief of Staff

III. THE CHIEF OF STAFF

a. Detailed by the President

b. Connection with the Secretary of War

c. Duties of the Chief of Staff

IV. THE STAFF (Organized into nine Staff Corps and Departments)

a. General Staff (Corps)
b. Adjutant General's Department
c. Inspector General's Department
d. Judge Advocate General's Department
e. Quartermaster Corps
f. Medical Department
g. Engineer Department
h. Ordnance Department
i. Signal Corps

a. <u>The General Staff (Corps)</u>

1. Composition

2. Length of appointment (Manchu Law)

3. Reappointment

4. Organization of the General Staff

(a) War Department General Staff

(1) Composition

(2) Division into Sections

Executive Division
War Plans Division
Purchase and Supply Division
Storage and Traffic Division
Army Operations Division

(b) The General Staff serving with Troops

(1) Composition

5. Duties of the General Staff

b. The Adjutant General's Department

1. Organization

2. Duties of the Department

c. The Inspector General's Department

1. Organization

2. Duties of the Department

3. Classification of inspections

d. The Judge Advocate General's Department

1. Organization

2. Duties of the Judge Advocate General

3. Duties of the Department

e. The Quartermaster Corps

1. Organization

2. Duties of the Department

f. The Medical Department

1. Organization

2. Duties of the Department

g. The Engineer Department

1. Organization

2. Duties of the Department

h. The Ordnance Department

1. Organization

2. Duties of the Department

i. The Signal Corps

1. Organization

2. Duties of the Department

3. Duties of the Chief Signal Officer

4. The Aircraft Production Board

(a) Organization

(b) Duties

V. THE WAR DEPARTMENT

a. Definition; composition

VI. TERRITORIAL DEPARTMENTS

a. Definition

b. List of the Departments

c. Department Commanders

VII. COAST ARTILLERY DISTRICTS

a. Definition

b. Subdivisions of Districts

TABLE A

UNITS	COMMANDER	COMPOSED OF
Battery or Mine Layer	Captain	1-4 guns or the same caliber or a mine layer.
(Company)	(Captain)	(Not a tactical unit. Used for drill and discipline.)
Fire or Mine Command	Major	2 or more batteries.
Fort Command	Major or Lieut. Col.	All the armament of a Fort.
Coast Defense Command	Lieut. Col. or Col.	One or more Forts protecting a restricted district.
Coast Artillery District	Brigadier General	A subdivision of the coast line for administration.

c. Note on the above units.

d. Duty of the Coast Artillery Corps

e. List of the Coast Artillery Districts

f. District Commanders

VIII. ORGANIZED DIVISIONS OF THE REGULAR ARMY, NATIONAL GUARD AND NATIONAL ARMY

a. Organization

b. Division Commanders

1. Rank and powers

2. Connection with Department Commanders

IX. THE AMERICAN EXPEDITIONARY FORCES

a. Organization

1. Naval Forces

2. Land Forces

b. Administration

THE ARMY OF THE UNITED STATES

The National Defense Act of June 3, 1916 divides the Army of the United State into the following parts:

Regular Army
Volunteer Army
Officers' Reserve Corps
Enlisted Reserve Corps
National Guard (Federalized)

To these may now be added:

United States National Army
(By Selective Draft, May 18, 1917.)

X. THE REGULAR ARMY

a. General classification

1. The Line

(a) Definition

2. The Staff

(b) Definition

3. Additional Groups

(c) Definition

b. The Line

1. Infantry

(a) Number of regiments in peace time

(b) Present numbering of Infantry units

(c) Division of Infantry Units of the Regular Army

TABLE B

UNITS	COMMANDER	COMPOSED OF
Section	Corporal or Sergeant	9-17 men in a section
Platoon	Lieutenant	Platoon HQ and 4 sections
Company	Captain	Company HQ and 4 platoons
Battalion	Major	4 companies
Regiment	Colonel	Regimental HQ and 3 battalions
Brigade	Brigadier General	2 infantry regiments
Division	Major General	2 infantry brigades
Army Corps	Lieutenant General	3 infantry division and corps troops
Army	General	3 or more army corps and additional troops

(d) Note on the Infantry Division

TABLE C

Organization of an Infantry Division

1 Division Headquarters (See Table D)
1 Machine Gun Battalion (2 companies, motorized)
2 Infantry Brigades (See Table E, F, G, H)
1 Field Artillery Brigades (See Tables I, K, L, M, N)
1 Engineer Regiment
1 Field Signal Battalion (See Table O)
1 Train Headquarters and Military Police
1 Ammunition Train
1 Engineer Train
1 Sanitary Train
1 Supply Train
1 Mobile Ordnance Repair Shop

26,312 men, 888 officers
AGGREGATE, 27,200

TABLE D

Organization of a Division Headquarters

Division Commander - Major General
3 Aids and 2 Aerial Observers
General Staff
Adjutant
Inspector
Quartermaster Department
Medical Department
Ordnance Department
Judge Advocate General's Department
Signal Corps Department
Veterinary Service
Headquarters Troop

135 men, 29 officers
AGGREGATE, 164

TABLE E

Organization of an Infantry Brigade

1 Brigade Headquarters
2 Infantry Regiments
1 Machine Gun Battalion (4 companies)
Medical and Veterinary Corps and Ordnance Department

7978 men, 232 officers
AGGREGATE, 8210

TABLE F

Organization of an Infantry Regiment

Regimental Headquarters
1 Headquarters Company
1 Machine Gun Company
1 Supply Company
3 Battalions
Medical and Ordnance Departments

3652 men, 103 officers
AGGREGATE, 3755

TABLE G

Organization of a Machine Gun Company

1 Headquar
1 Headquarters
3 Platoons
1 Train
16 Heavy Machine Guns

172 men, 6 officers
AGGREGATE, 178

TABLE H

Organization of a Rifle Company, Infantry Regiment

1 Headquarters, with 2 officers (Capt. & 1st Lieut.) & 18 men
4 Platoons, with a total of 4 officers (Lieuts.) and 232 men

Each Platoon consists of:

1 Platoon Headquarters - 1 Lieutenant, 1 Sergeant (who is an Assistant Commander) and 4 men	
1st Section - Handbombers	12 men
2nd Section - Rifle Grenadiers	9
3rd Section - Riflemen	17
4th Section - Automatic Riflemen	15
Total	58 men

Total Company - 6 officers, 250 men AGGREGATE, 256

The senior First Lieutenant is second in command.
First and Fourth Platoons commanded by First Lieutenants.
Second and Third Platoons commanded by Second Lieutenants.
Additional officers from Regular Army, Reserve Corps or National Army.

2.

2. Cavalry

(a) Number of Regiments in peace time

(b) Numbering of Cavalry units

(c) Organization of Cavalry Regiment

3. Field Artillery

(a) Number of Regiments in peace time

(b) Present numbering of units

(c) Types of Field Artillery

(1) Light Artillery

(2) Mountain Artillery

(3) Heavy Artillery

(4) Horse Artillery

TABLE I

Organization of a Field Artillery Brigade (Divisional)

Brigade Headquarters
2 Regiments of 3" Field Guns (2-battalion regiment)
1 Regiment of 6" Howitzers (3-battalion regiment)
1 Trench Mortar Battery (12 mortars)
Medical and Veterinary Corps and Ordnance Department

(2 or 3 battalions per regiment
3 or 2 batteries per battalion
4 guns per battery.
Total number of guns - 72)

4781 men, 185 officers
AGGREGATE, 4966

TABLE K

Organization of a Regiment of Light Artillery (3-inch)

1 Regimental Headquarters
1 Battalion Headquarters
1 Headquarters Company
6 Batteries
Medical and Ordnance Departments
1 Supply Company.

1424 men, 55 officers
AGGREGATE, 1479

TABLE L

Organization of a Battery, 3" Light Artillery Regiment

Battery Headquarters
Special Details (Instrument, Signal and Scout)
Firing Battery (Sections 1 to 5 inclusive)
Combat Train (Sections 6 to 9 inclusive)

193 men, 5 officers
AGGREGATE, 198

TABLE M

Organization of a Regiment of Heavy Field Artillery

Regimental Headquarters
3 Battalion Headquarters
1 Headquarters Company
1 Supply Company
6 Batteries
Medical and Ordnance Departments

1703 men, 63 officers
AGGREGATE, 1766

TABLE N

Organization of a Battery of a 6" Howitzer Regiment

Battery Headquarters
Special Detail (Instrument, Signal and Scout)
Firing Battery (Sections 1 to 5 inclusive)
Combat Train (Sections 6 to 9 inclusive)
Medical and Veterinary Corps and Ordnance Department

228 men, 5 officers
AGGREGATE, 233

4. The Coast Artillery Corps

(a) Total peace time authorization

(b) Numbering of units

5. The Engineer Troops (Corps of Engineers)

(a) Peace time organization

(b) Present organization

(c) Numbering of Engineer units

6. Porto Regiment of Infantry

(a) Organization

Notes on Administration and Organization of the United States Army
(Continued)

7. Indian Scouts

(a) Organization

8. Philippine Scouts

(a) Organization

b. The Staff

Composed of nine corps and departments which have been already discussed. For the organization of Aero Squadrons and the Field Signal Battalion see the succeeding tables.

c. Additional Groups

1. Detached Officers

2. Detached Non-commissioned Officers

3. Chaplains

4. The Regular Army Reserve

5. Retired Officers

6. Retired Enlisted Men

7. Other Smaller Groups

d. Size of the Regular Army in peace time

XI. THE VOLUNTEER ARMY

a. Organization

b. Present status

XII. THE OFFICERS' RESERVE CORPS

a. Purpose

b. Organization

c. Period of service in peace time

d. Present status

e. Reserve Officers' Training Corps

1. Senior division

2. Junior Division

3. United States Training Camps

XIII. THE ENLISTED RESERVE CORPS

a. Purpose

b. Organization

c. Period of service in peace time

d. Present status

XIV. THE NATIONAL GUARD

a. Note on the composition of the Militia

b. Organization

c. Number authorized

d. Assignment of officers by the President

e. Appropriation of funds

f. Present status

g. Numbering of "U.S.N.G." units

XV. THE UNITED STATES NATIONAL ARMY

a. Status

b. Organization

c. United States Guard

d. The Chemical Service Section

e. The Tank Corps

f. Numbering of National Army units

ORGANIZATION OF SIGNAL CORPS UNITS

TABLE O

Organization of a Field Signal Battalion

1 Headquarters	
1 Supply Section	248 men, 14 officers
1 Wire Company	AGGREGATE, 262
1 Radio Company	
1 Outpost Company	
Medical Department	

ORGANIZATION OF AERO SQUADRONS

CONSTRUCTION, SUPPLY, REPAIR, SERVICE

COLUMN	HEADING
I.	Construction Squadron
II.	Supply Squadron
III.	Repair Squadron
IV.	Service Squadron

	I	II	III	IV
Major	----	----	----	1
Captain	1	1	1	17
First Lieutenant	10	10	10	
Medical Officer (Captain or 1st Lieut.)	----	----	----	1
Total Commissioned	11	11	11	19
Master Signal Electrician	4	1	4	4
Sergeants, First Class	22	9	29	21
Sergeants	22	22	33	17
Corporals	26	15	33	8
Chauffeurs, First Class	5	5	3	8
Chauffeurs	15	25	12	18
Cooks	6	8	8	6
Privates, First Class	17	22	9	23
Privates	33	43	19	46
Privates, 1st Class or Privates (Med. Dept.)	----	----	----	3
Total Enlisted	150	150	150	154
AGGREGATE	161	161	161	173

SQUADRON COMPOSITION

I. Construction Squadron
- 1 Headquarters Section
- 1 Squadron Supply Section
- 3 Construction Sections

II. Supply Squadron
- 1 Headquarters Section
- 1 Squadron Supply Section
- 3 Supply Sections

III. Repair Squadron
- 1 Headquarters Section
- 1 Squadron Supply Section
- 3 Repair Sections

IV. Service Squadron
- 1 Headquarters Section
- 1 Squadron Supply Section
- 1 Engineer Section
- 12 Aero Sections

ORGANIZATION OF AERO SQUADRONS (Cont.)

SQUADRON EQUIPMENT

I. Construction		II. Supply		III. Repairs		IV. Service	
Bicycles	5	Dodge Cars	5	Motor Cars	3	Airplanes	1[illegible]
Ford Cars	5	M-C's & Side cars	8	M-C's & Side cars	6	Motor cars	4
M-C's & Side cars	6	M-T's($1\frac{1}{2}$ & 3 ton)	25	M-T's ($1\frac{1}{2}$ ton)	12	M-C's, Side cars	6
M-T's(3 & 5 ton)	15	Trailers ($1\frac{1}{2}$ ton)	25	Trailers	12	M-T's($1\frac{1}{2}$ & 3 ton)	16
Trailers ($1\frac{1}{2}$ ton)	25	Pistols	161	Pistols	161	Trailers	1[illegible]
Pistols	161					Machine Guns	72
						Pistols	168

M-C = Motor Cycle M-T = Motor Truck.

Summary of Trades in a Service Aero Squadron

13	Airplane Mechanicians
7	Auto Mechanics
2	Auto Body Builders
2	Balloon Riggers
2	Cabinet Makers
25	Chauffers
6	Clerks
8	Cooks
2	Draftsmen
13	Engine Repairmen
2	Engine Testers
3	Fabric Workers
7	Instrument Repairers
6	Machinists
1	Magneto Repairer
2	Metal Workers
10	Motorcyclists
4	Painters
1	Propeller Maker
2	Radio Mechanics
1	Stenographer
13	Stock-keepers
1	Truckmaster
2	Vulcanizers
2	Welders
13	Non-specialists

Medical Personnel of Aero Squadrons

The Medical personnel authorized for each three squadrons acting together (Construction, Supply, Repair, but not Service) is as follows:

1 Captain or First Lieutenant
1 Sergeant, First Class
1 Sergeant
4 Privates, First Class or Privates

Squadrons acting independently are to have Medical personnel assigner according to circumstances.

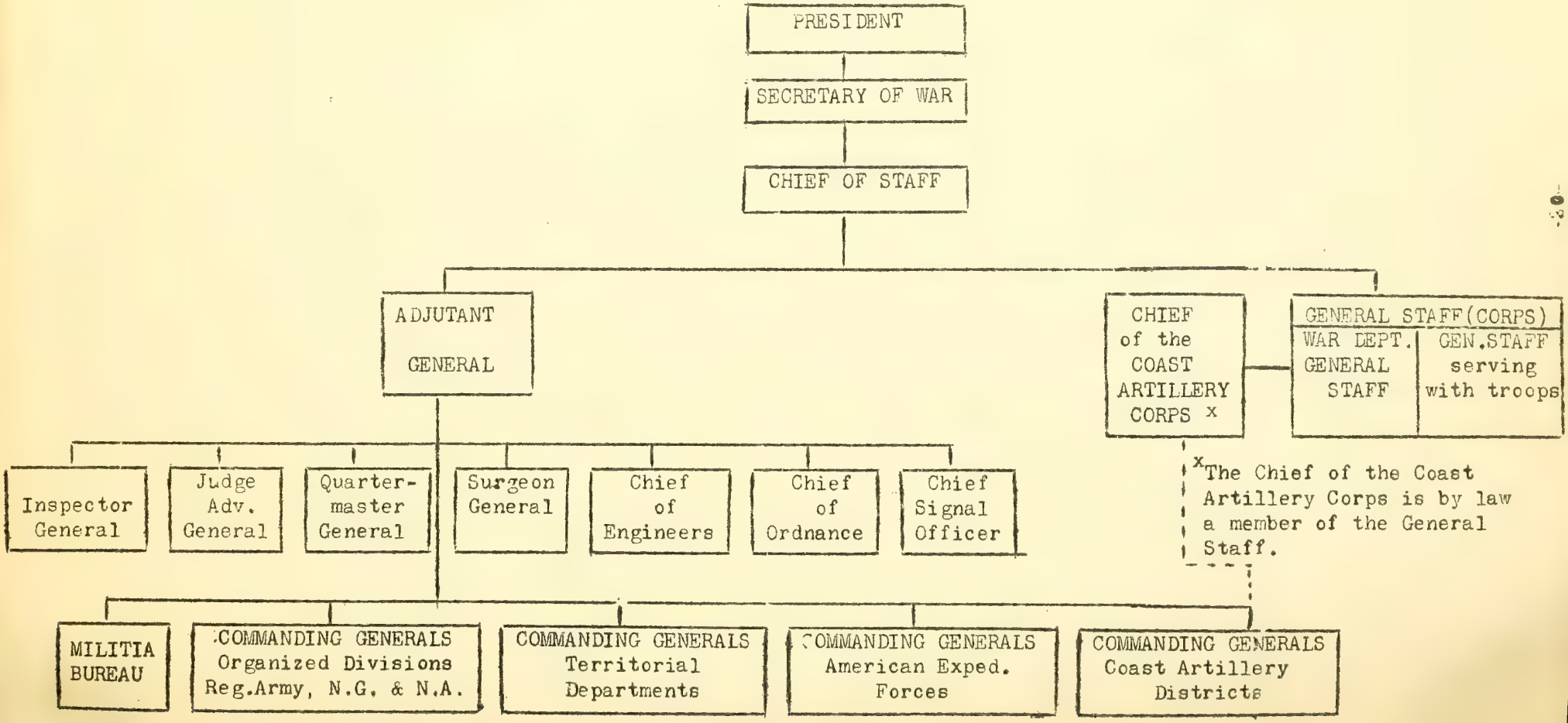
The Medical personnel assigned to a Service Aero Squadron is included in the table on the previous page and is as follows:

1 Captain or First Lieutenant
1 Sergeant
3 Privates, First Class or Privates

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MILITARY SUBJECTS DEPARTMENT

CHART SHOWING THE ADMINISTRATION OF THE UNITED STATES ARMY
(To accompany lecture notes)



x The Chief of the Coast Artillery Corps is by law a member of the General Staff.

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5-7-18.

MILITARY SUBJECTS DEPARTMENT

STUDENT'S NOTES ON MILITARY COURTESY

MILITARY COURTESY

A. ORIGIN AND EXPRESSION OF COURTESY

B. VISITS AND SOCIAL CALLS

C. ESCORTS OF HONOR

D. FUNERAL ESCORTS

E. SALUTES WITH CANNON

1. Salute to the Union

2. The National Salute

3. Personal Salutes

4. Temporary suspension of Salutes with Cannon

F. SALUTES RENDERED BY THE INDIVIDUAL

1. Origin

2. Types of Salute

a. The rifle salute -

1. Its use.

2. Indoors.

3. Outdoors.

b. The salute with sword or saber -

c. The present arms -

1. Its use.

(a)

(b)

d. "Eyes Right" (or Left) -

e. The hand salute -

1. Its use.

2. Its execution.

3. Manner of saluting

a. What the salute indicates -

b. The salute always given at attention -

1. The rule.

2. Interpreting the rule.

(a) Rising to salute, if seated

Exceptions:
(b) Returning a salute

(c) Saluting while riding

4. Saluting distance

5. "Common sense" in interpreting regulations

G. PERSONS AND THINGS TO BE SALUTED.

I. OFFICERS (including officials of the U.S. on official occasions)
II. COLORS & STANDARDS NOT CASED
III. THE NATIONAL ANTHEM
IV. THE BUGLE CALLS "TO THE COLOR" & "TO THE STANDARD".

I. SALUTES TO OFFICERS

a. Foreword -

b. General rule for saluting officers-

c. Rendering the salute-

1. The rule.

2. Interpreting the rule.

(a) The spirit

(b) Saluting in "groups"

(1) Two groups passing -

(2)
(2) Enlisted men in groups -

(c) Officers making reports

(d) Officers of same grade

(e) Verbal greetings between officers

d. Returning the salute-

1. Importance.

2. Saluting in "groups".

(a) Group of enlisted men

(b) Group of officers

e. Addressing an officer-

1. Salutes.

2. Mode of addressing.

f. Omission of salutes to officers-

1. Foreword.

2. In military formation (in ranks), at drill, etc.

(a) When not called out of ranks

(b) When called out of ranks

3. At work.

4. At games.

5. At mess.

(a) Enlisted men, not individually addressed.

(b) Enlisted men, individually addressed

6. Indoors.

(a) Enlisted men, unarmed

(b) Enlisted men, armed

(c) Officers, unarmed

(d) Officers, armed

7. Marching at double time, etc.

8. In public places.

9. On repeated occasions.

II. SALUTES TO COLORS AND STANDARDS (NOT CASED)

a. General rule-

b. Definition of terms-

1. Flag.

2. Colors.

(a) National

(b) Regimental, etc.

3. Standards.

(a)

(b)

(c)

c. Rules for saluting-

1. In uniform.

2. Not in uniform.

(a) Covered

(b) Uncovered

III. SALUTES TO NATIONAL ANTHEM & BUGLE CALLS

a. The National Anthem-

b. The Bugle Calls-

c. National Anthems of other countries-

d. Regulations-

1. In uniform

(a) Covered

(b) Uncovered

2. Not in uniform.

(a) Covered

(b) Uncovered

H. SALUTING WHEN COMMANDING A UNIT

a. Type of salute-

b. Salutes to officers-

1. Officers of superior grade.

(a) Passing in front of, or near the command

(b) Passing in rear of the command

2. Officers of equal or junior grade.

(a)

3. Special salutes to certain officers.

4. Salutes between commanding officers.

5. Turning over the command.

c. Salutes to Colors, Standards, National Anthem, Bugle Calls-

1. At ceremonies.

(a) Under arms

(b) Without arms

2. Upon other occasions.

(a) Colors and standards

(b) National Anthem - Bugle Calls

I. SALUTES BY SENTINELS

a. The rule-

b. Type of salute-

c. Method of saluting an officer-

d. Speaking with an officer-

K. SALUTING LADIES

a. The custom.

b. Its use.

L. PRISONERS FORBIDDEN TO SALUTE

M. USUAL MISTAKES IN SALUTING

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

ALWAYS USE GOOD JUDGMENT IN THE MATTER OF SALUTING-- AND,

"WHEN IN DOUBT, SALUTE."

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MILITARY SUBJECTS DEPARTMENT

GUARD DUTY -- STUDENT'S NOTES

I. TYPES OF GUARDS

A. EXTERIOR GUARDS

(1) When used -

(2) Purpose -

(3) Nature -

B. INTERIOR GUARDS

(1) When used -

(2) Purpose -

(3) Nature -

C. MILITARY POLICE

(1) When used -

(2) Purpose -

(3) Nature -

D. PROVOST GUARDS

(1) When used -

(2) Purpose -

(3) Nature -

II. INTERIOR GUARDS.

A. CLASSIFICATION

(1) Main Guard.

(2) Special Guards:

III. DETAILS AND ROSTERS

(1) When and where made -

(2) Number detailed -

(3) Company Details -

(4) Adjutant, Sergeant Major and Band for formal guard mounting -

(5) When a single organization furnishes the guard -

(6) When the guard is detailed from several organizations -

(7) Special Guards -

(8) Guard details posted -

(9) Interval between tours -

(10) Daily relief -

(11) Data needed by company commanders -

(12) Details made by roster -

IV. THE COMMANDING OFFICER

A. DUTIES

(1) Performance of duty by the guard -

(2) Specifications
(2) Specific duties -

V. THE OFFICER OF THE DAY

A. DUTIES

(1) Performance of duty by the guard -

(2) Guard inspection -

(3) Patrols -

(4) Parole and countersign-

(5) Subject to order of -

(6) Prisoners and Guard House inspection -

(7) Guard report -

(8) Where the Officer of the Day may be found -

VI. COMMANDER OF THE GUARD

A. DUTIES

(1) Instruction and discipline -

(2) Visiting the guard -

(3) Subject to orders of -

(4) Responsibilities -

(5) Where officers of the guard may be found -

(6) Duties when a sentinel calls: "The Guard". -

(7) Guard inspections -

(8) When guard is turned out -

(9) Sounding of calls -

(10) Flag and gun detail -

(11) Members of the guard while at the guard house -

(12) Prisoners sent to the guard house -

(13) Sentences of the prisoner -

(14) Meals sent to the guard house -

(15) Security of prisoners -

VII. SERGEANT OF THE GUARD (Senior non-commissioned officer)

A. DUTIES

(1) In absence of commander of the guard -

(2) Responsibility -

(3) Lists of men -

(4) Turning out of reliefs -

(5) Custodian of keys -

(6) Instruction of corporals -

VIII. CORPORAL OF THE GUARD

A. DUTIES

(1) Subject to orders of -

(2) Posting and relief of sentinels -

(3) Lists of men -

(4) Call of sentinel for "Corporal of the Guard"

(5) Where the corporal of the guard may be found -

(6) Arrested persons -

(7) Prescribed salute -

IX. MUSICIANS OF THE GUARD

(1) Duties -

X. ORDERLIES AND COLOR SENTINELS

(1) By whom selected -

(2) How selected -

XI. PRIVATES OF THE GUARD.

(1) By whom assigned to reliefs and posts -

XII. ORDERS FOR SENTINELS

(1) General -

(2) Special -

XIII. GENERAL ORDERS

(1)

(2)

(3)

(4)

(5)

(6)

(7)

(8)

(9)

(10)

(11)

(12)

XIV. SPECIAL ORDERS FOR SENTINELS AT THE POST OF THE GUARD

(1)

(2)

XV. COUNTERSIGNS AND PAROLES

(1) Definition -

(2) How received -

(3) Prearranged signals -

XVI. GUARD PATROLS

(1) Definition -

(2) Information necessary when patrols are sent out -

XVII. WATCHMEN

(1) Distinguished from sentinels -

(2) When used -

XVIII. COMPLEMENTS OF GUARDS

(1) Definitions-

XIX. GENERAL RULES CONCERNING GUARD DUTY

(1) Hiring another -

(2) Sentinel found absent from, or drunk or asleep on post -

(3) Instructions to members of the guard -

(4) Leaving immediate vicinity of the guard house -

(5) Removing accounterments or clothing -

XX. FLAGS

(1) Kinds -

(2) When hoisted and lowered -

(3) Respect paid the flag while being lowered -

(4) When a salute is fired -

(5) Dipping the flag -

(6) Half-mast -

(7) Flag Detail -

(8) Care used in hoisting and lowering the flag -

(9) Folding the flag -

XXI. REVEILLE AND RETREAT GUN

(1) By whom fired -

(2) When fired -

(3) Gun detail -

XXII. GUARD MOUNTING

(1) Nature -

XXIII. FORMAL GUARD MOUNTING

(1) (Diagram)

XXIV. INFORMAL GUARD MOUNTING

(1) (Diagram)

XXV. RELIEVING THE OLD GUARD

(1) (Diagram)

XXVI. BUGLE CALLS

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MEMORANDUM:

1. The following questions and answers indicate some of the more important provisions of the Manual of Interior Guard Duty with reference to the duties of privates of the guard.

2. Any member of the guard found ignorant of these provisions will be reported as delinquent in guard duty.

3. Questions and Answers:

1. Where must members of the main guard who are not on post, stay?

Ans. Without permission from the commander of the guard, members of the main guard, except orderlies, will not leave the immediate vicinity of the guard house. Permission to leave will not be given except in cases of necessity.

2. May members of the main guard remove their clothing while at the guard house?

Ans. No. Not without permission from the commander of the guard.

3. What clothing may be removed with permission from the commander of the guard?

Ans. Only excess clothing such as gloves, overcoats, overshoes, hats, etc. Members of the guard will keep their belts on at all times.

4. During his tour, to whose orders is a member of the guard subject?

Ans. To orders of the Commanding Officer, Officer of the Day, officers and non-commissioned officers of the guard, only.

5. How does a sentinel on post salute?

Ans. To salute with the piece at a right shoulder, a sentinel halts and faces toward the person to be saluted when the latter arrives within thirty paces, remaining at the right shoulder. The salute (PRESENT ARMS) is rendered at six paces, or if the person to be saluted does not arrive within six paces, when he is nearest. The same rule applies to colors and standards.

6. Who and what does a sentinel on post salute?

Ans. All officers, all colors or standards not cased, the National Anthem, and the calls "To the Color" and "To the Standard."

7. When does a sentinel salute?

Ans. When not engaged in the performance of a specific duty, the proper execution of which would prevent it. Officers should be saluted at all times of the day or night.

8. Where are the arms of members of the guard who are at the guard house kept?

Ans. In the armracks, if they are provided. Arms will not be removed from the racks unless required in the performance of some duty.

9. Who assigns privates to reliefs and posts?

Ans. To reliefs by the commander of the guard and to posts by the corporal of the relief. They will not change from one relief or post to another during the same tour of guard duty, unless by proper authority.

10. How is a sentinel relieved? *Ans.* See pars. 108–112, Manual Interior Guard Duty.

11. What information does a sentinel communicate to his successor when relieved?

Ans. All special orders in detail, relating to his post.

12. May a soldier hire another to do his duty for him?

Ans. No.

13. What is done to a soldier who is found drunk or asleep on post?

Ans. Any soldier who is found drunk or asleep on his post, or who leaves it before being properly relieved, shall suffer such punishment as a court martial may direct, which in time of war may be death. (A. W. 86.)

14. What classes of orders are there for sentinels on post?

Ans. General orders which apply to all sentinels and special orders which apply to particular posts or duties.

15. What are the General Orders for sentinels?

Ans. (1) To take charge of this post and all government property in view.
(2) To walk my post in a military manner, keeping always on the alert and observing everything that takes place within sight or hearing.
(3) To report all violations of orders I am instructed to enforce.
(4) To repeat all calls from posts more distant from the guard house than my own.
(5) To quit my post only when properly relieved.
(6) To receive, obey, and pass on to the sentinel who relieves me all orders from the Commanding Officer, Officer of the day, and officers and non-commissioned officers of the guard only.
(7) To talk to no one except in line of duty.
(8) In case of fire or disorder to give the alarm.
(9) To allow no one to commit a nuisance on or near my post.
(10) In any case not covered by instructions to call the corporal of the guard.
(11) To salute all officers, and all colors and standards not cased.
(12) To be especially watchful at night, and, during the time of challenging, to challenge all persons on or near my post and to allow no one to pass without proper authority.

16. What additional orders are there for the sentinel at the guard house?

Ans. (1) Between reveille and retreat to turn out the guard for all persons designated by the commanding officer, for all colors or standards not cased, and in time of war for all armed parties approaching my post, except troops at drill and reliefs and detachments of the guard.
(2) At night after challenging any person or party, to advance no one but call the corporal of the guard, repeating the answer to the challenge.

17. How does a sentinel on post change the position of his rifle and turn about?

Ans. He is not required to halt, and change the position of his rifle on arriving at the end of his post, nor to execute to the rear march, precisely as prescribed by the drill regulations, but faces about while marching, in the way most convenient to him, either right or left about, and at any part of his post, as may be best suited to the performance of his duties. He carriers his rifle at either shoulder, and in wet or severe weather, when not in a sentry box may carry it at a secure.

18. When challenging, calling, etc., how does a sentinel hold his rifle?

Ans. When challenging, calling, or holding communication with any person a sentinel comes to PORT ARMS. At night he should place himself in the best possible position to receive or if necessary, to arrest the person or party challenged.

19. Should a sentinel give his piece to anybody?

Ans. A sentinel will quit his piece on an explicit order from any person from whom he lawfully receives orders while on post; under no circumstances will he yield it to any other person.

20. What persons should a sentinel arrest?

Ans. Suspicious persons prowling about at any time, all parties to a disorder occurring on or near his post, or any unauthorized persons who attempt to cross his post at night. All arrested persons should be turned over to the corporal of the guard.

21. What should the sentinel report to the corporal of the guard?

Ans. Every unusual or suspicious occurrence noticed.

22. When may a sentinel call for relief?

Ans. When by reason of sickness or other cause, relief is necessary.

23. How does a sentinel call for relief?

Ans. Corporal of the Guard, No. (.....) *Relief,* giving the number of his post.

24. How does he call the corporal for any other purpose?

Ans. Corporal of the Guard, No. (.....), adding the number of his post.

25. If a sentinel finds that the corporal is not needed, should he call "never mind the corporal."?

Ans. Under no circumstances will a sentinel call "never mind the corporal," nor will a corporal heed such call if given.

26. What will a sentinel do in case of fire?

Ans. Call: *Fire, No.* (.....), giving the number of his post. If possible he will extinguish the fire himself. If the danger be great he will discharge his piece before calling.

27. What will a sentinel do in case of disorder?

Ans. Call: *The Guard, No.* (.....), adding the number of his post and discharging piece if the danger is great.

28. At night how close will a sentinel permit a person to approach him?

Ans. Not too close to prevent the proper use of his own weapon before recognizing the person or receiving the countersign.

29. When does a sentinel challenge?

Ans. Between retreat (or the hour designated by the comanding officer) and broad daylight (or the hour designated by the commanding officer).

30. Who does a sentinel challenge?

Ans. All persons on or near his post, during the time of challenging.

31. How does a sentinel challenge?

Ans. He will advance rapidly toward any person on or near his post and when within about thirty paces will challenge sharply, *Halt. Who is there?*

32. After receiving an answer to his challenge, what does sentinel do?

Ans. Commands: *Advance* (.....), *to be recognized,* repeating the answer to his challenge.

33. When the person advanced is recognized what does the sentinel do?

Ans. Commands: *Advance* (.....). He comes to present arms if the person advanced is entitled to a salute.

34. How are a number of persons advanced?

Ans. By the command: *Advance, one, to be recognized.*

35. How many persons will a sentinel allow to approach him at one time?

Ans. One.

36. What should the sentinel do if he fails to recognize the person or party advanced?

Ans. Call the corporal of the guard.

37. What is done if two or more parties approach from different directions at the same time?

Ans. All are challenged in turn. The senior is advanced first.

38. If one party is communicating with a sentinel and another approaches, what is done?

Ans. The sentinel will challenge such party. If the challenged party be senior to the party already at the sentinel's post, he will advance such party at once.

39. What order of rank governs a sentinel in advancing persons or parties?

Ans. The following order should be observed: Commanding Officer, Officer of the Day, Officers of the Guard, Officers, Patrols, Reliefs, Non-commissioned Officers of the Guard, in order of rank, and Friends.

40. When is the guard turned out as a compliment?

Ans. Between reveille and retreat only.

41. How does the sentinel on post No. 1 know when to turn out the guard?

Ans. He should recognize and turn out the guard for the Commanding Officer, Officer of the Day, and all General Officers. For other persons, notice will be given him in advance that they are in the vicinity.

42. How does a sentinel turn out the guard?

Ans. Calls: *Turn out the guard,* (.....), repeating, Officer of the Day, National Colors, etc., as the case may be.

43. How is the guard turned out for the new guard?

Ans. Turn out the guard, armed party.

44. What is done if the person named by the sentinel does not wish the guard formed?

Ans. He will salute, whereupon the sentinel will call: *Never mind the guard.*

45. Should a sentinel call "Never mind the guard", in case of an armed party?

Ans. No.

46. Would a sentinel call for the guard to turn out if it were already formed?

Ans. Yes, except as provided in the answer to question 47.

47. Would the sentinel turn out the guard for two or more persons at the same time?

Ans. The guard would be turned out for the senior only. If the senior does not desire the guard formed, the sentinel then calls, *Never mind the guard.* The guard will not be turned out for an officer while a senior entitled to the compliment is at or coming to the post of the guard.

48. What does the sentinel at the guard house do at night after receiving an answer to his challenge?

Ans. Calls: *Corporal of the guard,* (.....), repeating the answer to the challenge.

49. What does he do while the corporal is recognizing the person or party?

Ans. He remains in the position assumed in challenging until the corporal has recognized and advanced the person or party challenged, when he resumes walking his post; if the person or party be entitled to it, he salutes, and then resumes walking his post.

50. If officers remain on or near a post, does a sentinel salute more than once?

Ans. No.

51. Will a sentinel interrupt a communication with one officer to salute another?

Ans. Not if the officer be junior to the one already at the post unless directed by the senior to do so.

52. Should prisoners under charge of a sentinel salute an officer?

Ans. No.

BY ORDER OF LIEUTENANT-COLONEL HUNTER:

CHARLES B. CRANE,
Captain, A. S., Sig. R. C.
Adjutant.

UNITED STATES
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY

MILITARY SUBJECTS DEPARTMENT
MILITARY HYGIENE, SANITATION & FIRST AID

STUDENT'S NOTES

(Including personal hygiene, sanitation, epidemiology, care of the feet, venereal diseases, and first aid.)

I DEFINITIONS

1. Hygiene
    a. General Hygiene
    b. Military Hygiene
2. Sanitation
    a. General Sanitation
    b. Conservancy
    c. Military Sanitation

II PERSONAL HYGIENE

1. Bathing
2. Care of the Teeth and Nails
3. Cleanliness of Quarters, Bedding, Floors, etc.
4. Individual Toilet Articles
5. Careof the Feet

6. Rest and sleep

7. Moderation in Eating, Drinking, Tobacco

III SANITATION

1. Means for prevention of disease

2. Conservancy

   a. Disposal of Excreta and Garbage

   b. Sewerage

   c. Latrines

3. Transference of diseases

   a. General Remarks

   b. Transference by contact

   c. Indirect Infection

   d. Insect-borne diseases

   e. Carriers

4. Channels of infection

5. Fomites

6. Aerial Transmission of disease

7. Inoculation against Typhoid and Paratyphoid

8. Immunity

   a. Natural

   b. Acquired

9. Principal communicable diseases

   a. Typhoid

   b. Paratyphoid

   c. Cholera

   d. Dysentery

   e. Epidemic Meningitis

   f. Malaria

   g. Yellow Fever

   h. Typhus Fever

   i. Small-pox

   j. Measles and Mumps

   k. Theories of Transmission

10. Water Supply

a. Types of Water

b. Purifying Water inthe Field

IV VENEREAL DISEASES

1. Dangers of Venereal Diseases

2. Historical Facts

3. Syphilis

4. Gonorrhoea

5. Chancroid

6. Prophylactic Treatment

7. Points to be Observed

V FIRST AID

1. Introduction

2. Resuscitation of the apparently drowned.

a. Artificial respiration

b. After-treatment

3. Unconsciousness from any cause

a. Treatment of some Emergency cases

1. Simple Fainting

2. Epileptic Fits

3. Apoplexy

4. Alcoholic Coma

4. Surgical Shock, due to Wounds and Injuries in the Field

a. Symptoms

b. Treatment

5. Electric Shock

a. Causes and treatment

6. Frost Bite and Freezing

a. General

b. Local

7. Sun or Heat-strokes or Insolation

a. Cause and Symptoms

b. Treatment

8. Heat Exhaustion

   a. Causes and Symptoms

   b. Treatment

9. Poisoning by way of the stomach

   a. Causes and symptoms

   b. Treatment

10. Bites of insects and snakes

   a. Symptoms

   b. Treatment

11. Rabies or Hydrophobia

12. Tetanus or Lockjaw

13. Anthrax

14. Burns and Scalds

   a. First, second, and third degree

   b. Treatment

15. Emergency treatment of wounds in the field

16. The arrest and control of hemorrhage due to wounds in the field

17. Fractures, sprains and dislocations

    a. Fractures

    b. Dislocations

    c. Sprains

18. Preparing patients for transportation

UNITED STATES
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ARTICLES OF WAR - STUDENT'S NOTES

DEFINITION OF ARTICLES OF WAR

The articles of war are revised statutes or laws enacted by Congress for the government of the armies of the United States.

ARTICLE 110.

A. Certain articles to be read and explained.

Article I.

a. Definitions.

1. Officer-

2. Soldier-

3. Company-

4. Battalion-

Article II.

a. Persons subject to military law.

1.

2.

3.

4.

5.

6.

Article XXIX.

a. Enlistment without discharge.-

1. Nature of offense -

2. Punishment -

Article LIV.

a. Fraudulent enlistment -

1. Definition of term -

2. Conditions necessary -

3. Punishment -

Article LV.

a. Officer making unlawful enlistment -

1. Conditions necessary -

2. Conditions necessary

Article LVI.

a. Muster rolls - false muster

1. Definition of term -

2. Conditions necessary -

3. Punishment -

Article LVII.

a. False returns - ommission to render returns

1. Definition of term -

2. Conditions necessary -

3. Punishment -

Article LVIII.

a. Desertion -

1. Definition -

2. Conditions necessary -

3. Punishment -

Article LIX.

a. Advising or aiding another to desert -

1. Conditions necessary -

2. Punishment -

Article LX.

a. Entertaining a deserter -

1. Conditions necessary -

2. Punishment -

Article LXI.

a. Absense without leave.

1. Definition -

2. Punishment -

Article LXII.

a. Disrespect towards the President, Vice President, Congress, Secretary of War, Governors, Legislatures.

1. Definition -

2. Punishment -

Article LXIII.

a. Disrespect towards superior officers -

1. Conditions necessary -

2. Punishment -

Article LXIV.

a. Assaulting or willfully disobeying superior officers.

1. Conditions necessary -

2. Punishment -

Article LXV.

a. Insubordinate conduct towards non-commissioned officers

1. Conditions necessary -

2. Punishment -

Article LXIV.

a. Mutiny or sedition.

1. Definition -

2. Conditions necessary -

3. Punishment -

Article LXVII.

a. Failure to suppress mutiny or sedition -

1. Conditions necessary -

2. Punishment -

Article LXVIII.

a. Quarrels; frays; disorders -

1. Powers of officers and non-commissioned officers -

2. Refusal to obey officer or non-commissioned officer -

3. Punishment -

Article LXIX.

a. Arrest or confinement of accused person -

1. Definition of terms -

2. When given for officers and enlisted men -

3. Punishment for breaking arrest or escaping from confinement -

Article LXX.

a. Investigation of and action upon charges -

1. Limit to period of confinement and arrest -

Article LXXI.

a. Refusal to receive and keep prisoners -

1. Conditions necessary -

2. Punishment -

Article LXXII.

a. Report of prisoners received -

1. When made -

2. Punishment for failure to make report -

Article LXXIII.

a. Releasing prisoners without proper authority -

1. Conditions necessary -

2. Punishment -

Article LXXIV.

a. Delivery of offenders to civil authorities -

1. In time of peace -

2. In time of war -

(WAR OFFENSES)

Article LXXV.

a. Misbehavior before the enemy -

1. Conditions necessary -

2. Punishment -

Article LXXVI.

a. Subordinance compelling commander to surrender -

1. Conditions necessary -

2. Punishment -

Article LXXVII.

a. Improper use of countersign -

1. Definition of term -

2. Conditions necessary -

3. Punishment -

Article LXVIII.

a. Forcing a safeguard -

1. Definition of term -

2. Conditions necessary -

3. Punishment -

Article LXXIX.

a. Captured property to be secured for public service -

1. Punishment for wrongful appropriation of, or neglect to secure certain property.

Article LXXX.

a. Dealing in captured or abandoned property -

1. Conditions necessary -

2. Punishment -

Article LXXXI.

a. Relieving, corresponding with or aiding the enemy -

1. Conditions necessary -

2. Punishment -

Article LXXXII.

a. Spies -

1. Definition of term -

2. Conditions necessary -

3. Punishment -

(MISCELLANEOUS CRIMES AND OFFENSES)

Article LXXXIII.

a. Military property - Willful or Negligent Loss, Damage, or Wrongful disposition -

1. Conditions necessary -

2. Punishment -

Article LXXXIV.

a. Waste or unlawful disposition of military property to soldiers -

1. Conditions necessary -

2. Punishment

Article LXXXV.

a. Drunk on duty -

1. Punishment -

(a) Officers -

(b) Any person subject to military law except an officer -

Article LXXXVI.

a. Misbehavior of sentinel -

1. Conditions necessary -

2. Punishment -

Article LXXXVII.

a. Personal interest in sale of provisions -

1. Conditions necessary -

2. Punishment -

Article LXXXVIII.

a. Intimidation of persons bringing provisions -

1. Conditions necessary -

2. Punishment -

Article LXXXII.

a. Good order to be maintained on wrongs redressed -

1. Punishment for failure to preserve order or to see reparation made to injured parties -

Article XC.

a. Provoking speaches or gestures -

1. Punishment -

Article XCI.

a. Dueling -

1. Definition of term -

2. Punishment -

Article XCII.

a. Murder - Rape

1. Punishment -

Article XCIII.

a. Various crimes -

1. Manslaughter, mayhen, arsen, burglery, robbery, larseny, embezzlement, perjury, assault, etc. -

2. Punishment -

Article XCIV.

a. Frauds against the government -

1. Examples -

2. Punishment -

Article XCV.

a. Conduct unbecoming an officer and gentleman -

1. Punishment -

Article XCVI.

a. General article -

1. Offenses included -

2. Punishment -

Article CIV.

a. Disciplinary powers of the commanding officers -

1. Disciplinary punishments authorized -

Article CV.

a. Injuries to Person or Property - Redress of -

1. How nature and amount of redress is determined -

Article CVI.

a. Arrest of deserters by civil officials -

Article CVII.

a. Soldiers to make good time lost -

Article CVIII.

a. Soldiers - Separation from the service -

1. Authority to give discharges -

Article CIX.

a. Oath of enlistment -

1. 'I, _____, do solemnly swear (or affirm) that I will bear true faith and allegiance to the United States of America; that I will serve them honestly and faithfully against all their enemies whomsoever; and that I will obey the orders of the President of the United States and the orders of the officers appointed over me, according to the Rules and Articles of War.'

2. By whom administered -

3-23-13.

UNITED STATES ARMY
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

MILITARY STUDIES DEPARTMENT

MILITARY LAW - STUDENTS' NOTES

I. MILITARY JURISDICTION

(a) Definition -

(b) Source -

(c) Kinds - 1. Military Law -

2. Military Government -

3. Martial Law at Home -

4. Martial Law in the Army -

(d) Exercise of - Military jurisdiction is exercised through the following Military Tribunals:

1. Courts-Martial -

2. Military Commissions and Provost Courts -

3. Courts of Inquiry -

4. Military Boards -

a. Examining Boards -

b. Retiring Boards -

c. Boards of Survey -

II. MILITARY LAW

(a) Sources of Authority:

1. Written -

2. Unwritten -

(b) When operative:

(c) Persons Subject to:

1.

2.

3.

4.

5.

6.

III. MILITARY GOVERNMENT

(a) Sources of Authority:

1.

(b) When operative:

(c) Persons Subject to:

1.

2.

IV. MARTIAL LAW AT HOME

(a) Sources of Authority:

1.

(b) Persons Subject to:

1.

V. MARTIAL LAW IN THE ARMY

(a) Sources of Authority:

1.

(b) Persons Subject to:

1.

VI. COURTS-MARTIAL (GENERAL REMARKS)

(a) Persons Eligible for Membership:

1.

(b) Jurisdiction:

1. Definition -

2. Nature -

3. Depends upon the following conditions -

a.

b.

c.

d.

(c) Limits of punishment:

1.

(d) Appointing the Court:

1. How appointed -

2. Accuser -

3. Power to appoint an attribute of command not of rank -

4. Cannot appoint self -

5. Control of court by appointing authority -

(e) Appeal:

1.

(f) Writs of Habeas Corpus:

1.

VII. COURTS-MARTIAL (GENERAL)

(a) Appointing authorities:

1.
2.
3.

a.
b.
c.

4.

(b) Members:

(c) Jurisdiction:

1.

2.

(d) Limits of Punishment:

1. Punishment discretionary except:

a.

b.

VIII. COURTS-MARTIAL (SPECIAL)

(a) Appointing authorities:

1.

2.

(b) Members:

(c) Jurisdiction:

1. Same as General Court-Martial except:
a.
b.
c.
d.

(d) Limits of Punishment:

1.
2.
3.
4.

IX. COURTS-MARTIAL (SUMMARY)

(a) Appointing authorities:

1.

(b) Members:

(c) Jurisdiction:

1. Same as for Special Court except:
   a.

   b.

(d) Limits of Punishment:

1.

2.

X. MILITARY COMMISSIONS

(a) Appointing authorities:

1.

(b) Members:

(c) Jurisdiction:

1.

2.

3.

(d) Limits of punishment:

1.

XI. COURTS OF INQUIRY

(a) Appointing authorities:

1.

(b) Members:

(c) Jurisdiction:

1. As to persons -

2. As to time -

3. As to subject matter -
   a.

   b.

   c.

(d) Limits of Punishment:

1.

XII. MILITARY BOARDS

(a) Appointing authorities:

1.

(b) Members:
(c) Jurisdiction:

(d) Limits of Punishment:

1.

XIII. PROCEDURE - BEFORE, DURING, AND IMMEDIATELY AFTER TRIAL BY COURT-MARTIAL.

(a) Arrest:

1. Definition -

2. By whom ordered -

3. Arrest of Deserters -

(b) Confinement:

1. Definition -

2. By whom ordered -

(c) Charges:

1. Nature -

2. Divided into two parts -

3. Number -

4. By whom initiated and preferred -

5. By whom signed -

6. Accumulative and Duplicative Charges -

7. Additional Charges -

8. Number of copies -

9. Charges accompanied by -

10. To whom forwarded -

(d) Investigation by Officer exercising authority to appoint Summary Court, or officer detailed by him:

1. Must be prompt -

2. Action taken after investigation -

3. Disposition of Charges -

(e) Organization of the Court-Martial:

1. Place, time, members, and Judge Advocate -

2. President of the Court -

3. Rank of Members -

4. Uniform -

5. Seating -

6. Roll Call -

7. Action taken when member is absent -

8. Voting -

9. Judge Advocate (in General and Special Courts) -

10. Counsel -

11. Reporter -

12. Interpreter -

13. Challenge -

14. Oaths -

15. Continuances -

(f) Arraignment:

1. Definition -

(g) Pleas:

1. To the jurisdiction -

2. In abatement -

3. In bar of trial -

4. To the general issue -

(h) Witnesses:

1. How civilian witnesses are procured -

2. Refusal to appear -

3. Fees -

4. Depositions -

5. Accused as witness -

6. Persons in the service as witnesses -

(i) Evidence:

1. Kinds -

(j) Hours of Session:

1.

(k) Adjournment:

1.

(l) Performance of other Duties by Members:

1.

2.

(m) Contempt of Court:

1.

(n) Findings:

1. Definition -

2. Votes necessary to convict -

(o) Previous convictions:

1.

(p) Sentence:

1. How imposed -

2. Votes necessary -

3. May consist of - (For officers)

(For enlisted men)

(q) Record:

1. Content -

2. Number compiled -

3. Loss of record -

4. Copy for accused -

5. Disposition of original -

6. By whom authenticated -

(r) Approval of sentence:

1. By whom approved -

2. Mitigation and Commutation -

3. Sentences of death and dismissal of officers -

4. Disapproval -

5. Reconsideration of sentence -

(s) Application for clemency:

1. How made -

2. Frequency of -

(t) Pardon:

1. By whom granted -

2. Nature -

XIV. COMPOSITION, POWERS, AND PROCEDURE OF COURTS OF INQUIRY

(a) Convening Order:

1.

2.

(b) Rank of Members:

1.

(c) Reporter and Interpreter:

1.

2.

(d) Powers of the Court:

1. To summon and examine witnesses -

2. Refusal to appear or testify -

3. Contempt -

(e) Procedure:

1. Presence of party whose conduct is being investigated -

2. Counsel -

3. Challenge -

4. Reduced numbers -

5. Oaths -

6. Examination of witnesses -

7. Depositions -

8. Conclusions -

9. Obligation of secrecy -

10. Revision by court -

11. Publication of proceedings -

(f) Record:

1. How authenticated -

2. Disposition of -

3. Admissible evidence -

XV. PROCEDURE FOR MILITARY COMMISSIONS

(a) Constitution and composition:

1.

(b) Sentences:

1. Nature -

(c) Record:

1. Approval -

2. Execution -

XVI. PROCEDURE FOR MILITARY BOARDS

(a) Powers:

1.

(b) Reports:

1.

(c) Review:

1. Authority -

2. Informal Boards -

NOTE:-

The names John Doe and Richard Roe have been substituted for the names of the officer and non-commissioned officer, respectively, involved in the trial hereby reported.

General Court-Martial Orders, No. 3.

WAR DEPARTMENT
Washington, March 28, 1918.

Before a general court-martial which convened at Camp Sheridan, Montgomery, Ala., October 24, 1917, pursuant to Special Orders, No. 40, October 6, 1917, and No. 44, October 10, 1917, Headquarters Camp Sheridan, Ala., and of which Lieut. Col. Myron C. Cox, 147th Infantry, was president, and Capt. Guy W. House, 145th Infantry, judge advocate, was arraigned and tried--

Capt. John Doe, 134th Machine-Gun Battalion.

Charge -- "Violation of the 96th Article of War."

Specification 1. -- "In that the said John Doe, Capt., 134th Machine Gun Battalion, on or about the 4th day of October, 1917, while in uniform and to the disgrace and discredit of the military service, became intoxicated."

"This at Montgomery, and in the county of Montgomery, Ala., on the day and date first stated."

Specification 2. -- "In that the said John Doe, Capt., 134th Machine Gun Battalion, on or about the 4th day of October, 1917, permitted and allowed 1st sergeant Richard Roe, a noncommissioned officer of his command, to drink intoxicating liquor in his presence, and in his company, and to become intoxicated; to the disgrace and discredit of the military service, and to the prejudice of the discipline of his command."

"This at Montgomery, Ala., and in the county of Montgomery, Ala., on the day and date first stated."

Specification 3. -- "In that the said John Doe, Capt., 134th Machine Gun Battalion, on or about the 4th day of October, 1917, although then and there well knowing the purchase and sale of intoxicating liquors to be used as a beverage, within the county of Montgomery, and State of Alabama, to be contrary to, and prohibited by, the laws of the State of Alabama, and of the United States of America; and the use of intoxicating liquors by officers and soldiers in uniform to be contrary to, and prohibited by, the laws of the United States of America, did himself, while in uniform, use intoxicating liquors as a beverage, and did permit the use of intoxicating liquors as a beverage by an enlisted man in uniform; he the said enlisted man, than and there being a noncommissioned officer of his command."

"This at Montgomery, Ala., and in the county of Montgomery, Ala., on the day and date first stated."

To which charge and specifications the accused pleaded as follows:

To Specifications 1 and 2, "Guilty."

To Specification 3, "Not guilty."

To the Charge, "Guilty."

FINDINGS.

Of Specifications 1 and 2, "Guilty."

Of Specification 3, "Guilty, except the words 'although then and there well knowing the purchase and sale of intoxicating liquors to be used as

a beverage, within the county of Montgomery, and State of Alabama, to be contrary to and prohibited by the laws of the State of Alabama, and of the United States of America; and the use of intoxicating liquors by officers and soldiers in uniform to be contrary to, and prohibited by, the laws of the United States of America', and of the excepted words 'Not guilty.'"

Of the Charge, "Guilty."

SENTENCE.

"To be dismissed from the service."

The sentence having been approved by the convening authority and the record of trial forwarded for the action of the President, under the 48th Article of War, the following are his orders thereon:

In the foregoing case of Captain John Doe, 134th Machine Gun Battalion, the sentence of dismissal imposed by the general court-martial is hereby confirmed and will be carried into execution.

WOODROW WILSON.

THE WHITE HOUSE,
28 March, 1918.

Capt. John Doe, 134th Machine-Gun Battalion, ceases to be an officer of the Army from April 1, 1918.
(201, A.G.O.)

By Order of the Secretary of War:

PEYTON C. MARCH,
Major General, Acting Chief of Staff.

Official:
H.P. McCAIN,
The Adjutant General.

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MILITARY SUBJECTS DEPARTMENT

TRENCH WARFARE - STUDENT'S NOTES

INTRODUCTION

A. TRENCH TERMINOLOGY

1. TRAVERSE

(a) Definition -

(b) Kinds.-

(c) Size -

2. FIRING BAY

(a) Definition -

(b) Size -

3. PARAPET

(a) Definition -

(b) Size -

4. PARADOS

(a) Definition

5. BERM

(a) Definition -

6. FIRING STEP

(a) Definition -

7. REVETMENT

(a) Definition -

(b) Kinds)-

3. LOOPHOLES AND NOTCHES

(a) Definition -

B. KINDS OF TRENCHES

1. FIRE TRENCHES

(a) Definition

2. COVERING OR DOUBLING TRENCHES

(a) Definition

3. APPROACH AND COMMUNICATION TRENCHES

(a) Definition -

(b) Nature -

(c) Kinds -

4. DUMMY TRENCHES

(a) Definition -

C. TACTICAL LOCATION OF TRENCHES

1. FRONT LINE TRENCHES

(a) Definition -

2. SUPPORT TRENCHES

(a) Definition -

(b) Nature -

3. RESERVE TRENCHES

(a) Definition -

(b) Nature -

4. CENTERS OF RESISTANCE

(a) Definition -

(b) Location -

5. GARRISONED SECTORS

(a) Definition -

6. UNGARRISONED OR PASSIVE SECTORS

(a) Definition -

(b) Location -

7. SALIENTS

(a) Definition -

(b) Purpose -

8. RE-ENTRANTS

(a) Definition -

D. SHELTERS

1. BOMBPROOFS

(a) Definition -

(b) Construction -

2. DUGOUTS

(a) Definition -

(b) Construction -

3. DRESSING STATIONS

(a) Definition -

(b) Construction -

4. LATRINES

(a) Definition -

(b) Construction -

5. AMMUNITION BOXES

(a) Definition -

(b) Location -

6. STORES BOXES

(a) Definition -

(b) Location -

E. OBSTACLES

1. BARBWIRE ENTANGLEMENTS

(a) Definition -

(b) How Constructed -

(c) Advantages -

2. TRIP WIRES

(a) Definition -

(c) Use -

3. BARRICADES

(a) Definition -

4. INUNDATIONS

(a) Definition -

(b) Methods employed -

5. ABATIS

(a) Definition -

6. MISCELLANEOUS

F. MEANS OF GAINING AND COMMUNICATING INFORMATION

1. OBSERVATION POSTS

(a) Definition -

(b) Location and nature -

2. LISTENING POSTS

(a) Definition -

(b) Location -

(c) Sentinels -

3. TELEPHONE, TELEGRAPH, WIRELESS

(a) Where used -

4. SIGNALS

(a) Kinds -

5. CARRIER PIGEONS

(a) Definition -

(b) Usefulness -

6. TRENCH RUNNERS

(a) Definition -

(b) Usefulness -

7. AIRCRAFT

(a) Definition -

(b) Usefulness -

G. SERVICE IN THE TRENCHES

1. EQUIPMENT OF TROOPS

2. TIME OF RELIEF

3. INFORMATION WHICH INCOMING OFFICER SHOULD OBTAIN FROM THE OUTGOING OFFICER

(a)

(b)

(c)

(d)

(e)

(f)

(g)

(h)

4. SENTINELS IN FIRE TRENCHES

5. REST IN THE TRENCHES

6. SMOKE AND COOKING

7. TRENCH CONSTRUCTION AT NIGHT

8. PATROLS AND RAIDING PARTIES

9. INSPECTIONS

10. BRINGING UP SUPPLIES

H. SNIPING

1. DEFINITION

2. HOW SNIPERS ARE EQUIPPED

3. DUTIES OF SNIPERS

I. GRENADES AND GRENADIERS

1. DEFINITION OF GRENADE

2. CLASSES OF GRENADES

(a) Rifle Grenades -

(b) Hand Grenades -

(1)

(2)

3. TRAINING AND EQUIPMENT OF GRENADIERS

4. WORK OF GRENADIERS IN ATTACK AND DEFENSE

J. GAS WARFARE - Discussed in detail in separate lectures.

K. LIQUID FIRE

1. NATURE

2. USE

L. BAYONET FIGHTING

1. IMPORTANCE OF -

2. WHERE INDIVIDUAL ATTACKS SHOULD BE DIRECTED -

M. MACHINE GUNS

1. IMPORTANCE -

2. MACHINE GUN EMPLACEMENTS

(a) Location -

(1)

(2)

(3)

(b) Nature

3. PROPER TARGETS

4. AMMUNITION SUPPLY

N. MINING

1. CONDITIONS NECESSARY TO SUCCESS

O. DRAINAGE OF TRENCHES

1. DRAINS

2. PUMPS

3. PITS

4. FLOORS

P. ATTACK ON A POSITION

1. PREPARATION OF THE ATTACK

a. Detailed study of the two opposing positions

(1) Our own position:

(2) Enemy position:

b. The position of departure

c. Smashing the enemy positions

2. THE ATTACK

a. Formations adopted:

b. The advance:

c. The combat:

d. Night fighting:

e. Laison during fighting:

f. Forwarding reserves, munitions, and food:

g. Organization of the conquered position:

Q. DEFENSE OF A POSITION

1. ORGANIZATION OF THE DEFENSE

a. Detailed study of the two opposing trench systems:

(1) As regards the position to be defended:

(2) As regards opposing position:

2. DEFENSE

a.

a. The maintenance of the troops under bombardment:

b. Defensive combat:

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MILITARY SUBJECTS DEPARTMENT

STUDENT'S NOTES - GAS WARFARE

I. INTRODUCTION

II. HISTORY OF GAS IN WARFARE

A. EARLY ATTACKS

B. EARLY DEFENSIVE MEASURES

1. Simple Masks

2. Chemicals

III. FORMS OF ATTACK

A. THE CLOUD ATTACK

1. Method of amnation

2. Detecting a cloud attack

a. Appearance

b. Whistling sound

c. Smell

d. Taste

3. Necessary properties of a gas

a. Physical

b. Chemical

4. Conditions necessary for success

a. Concentration of gas

b. Quantity

c. Surprise

d. Weather conditions

e. Nature of the terrain

5. Kinds of gases used

a. Chlorine

b. Phosgene (carbonyl chloride)

B. THE GAS SHELL ATTACK

1. Similarity to cloud attack

2. Special uses of a gas shell

   a. Barrage fire

   b. To silence artillery

   c. To demoralize troops

   d. To prevent reinforcements, etc.

3. Detecting gas shells

4. Construction of gas shells

   a. General notes

   b. Special German shells

      1. The 7.7 green cross shell

      2. The 7.7. yellow cross shell

      3, The 7.7. blue cross shell

      4. The 7.5 trench mortar shell

5. Nature of gases used

   a. General

   b. Lethal gases

      (1) Palite (monochloromethylchloroformate)

      (2) Diphosgene (trichloromethylchloroformate)

(3) Carbon monoxide

c. Neutralizing gases

(1) Lachrymators (gases which produce tears)

(2) Sternutators (which cause sneezing)

(3) Irritants (Eye, lung and skin)

IV. CLASSIFICATION OF GASES

A. GASES SUITABLE FOR CLOUD ATTACKS

1. Asphyxiating gases

a. Chlorine
b. Bromine
c. Phosgene

B. GASES SUITABLE FOR SHELLS

1. Asphyxiating gases

a. Phosgene
b. Cholropicrin
c. Sulphur trioxide
d. Acrolein
e. Dimethyl sulphate
f. Bromacetone
g. Sulphur dioxide

2. Lachrymatory gases

a. Benzyl bromide
b. Stannic chloride
c. Methyl chloroformate
d. Bromacetic ester
e. Chloracetone
f. Iodacetic ester
g. Formol
etc.

3. Paralysant gases

a. Prussic acid

b. Hydrogen sulphide
c. Arsine

V. PRECAUTIONARY AND DEFENSIVE MEASURES

A. WITHIN TWO MILES OF THE FRONT

1. Precautionary measures adopted

a. Inspections

b. Shelter entrances

c. Sentries

d. Ammunition

2. Means of giving alarm

a. Strombos horn

b. Triangular iron rails

c. Telephones

d. Orderlies

3. Meteorological observations

a. Procedure

b. Beaufort Scale

Speed in M.P.H.	Observation of Natural Objects	Behavior of Flag at Top of Vane
0	Smoke straight up	No movement
2	Smoke slants	No movement
5	Wind felt on face	Slight movement
10	Paper moves on ground	Three quarters up
15	Bushes sway	Up and falling often
20	Wavelets on water Treetops sway	Up and falling less often
30	Trees sway and whistle	Up and flapping

c. Formula

4. Protection of shelters

a. Entrances

b. Ventilator shafts

c. Instruments

5. Special Noncommissioned Gas Officers

a. Duties

(1)

(2)

(3)

(4)

(5)

(6)

(7)

B. WITHIN TWELVE MILES OF THE FRONT

1. Precautionary methods adopted

a. Inspections

b. Masks

c. Gas Sentries

d. Duties of Commanders

C. SUMMARY OF PROTECTIVE MEASURES

1.

2.

3.

4.

5.

6.

VI. THE ENEMY GAS ATTACK

1. Men in trenches

2. Men on special duty

B. BEHAVIOR DURING ATTACK

1. General

2. Work stops

3. Talking

C. ACTION FOLLOWING ATTACK

1. General

2. Exertion

a.

b.

c.

d.

3. Cleansing of contaminated clothing

4. Treatment of gas shell holes

VII. OUR OWN ATTACK

A. PRECAUTIONS TAKEN

1. Working parties

2. Troops in the front line

VIII. SYMPTOMS SHOWN BY VICTIM OF CHLORINE GAS

A. FIRST SYMPTOMS

1. Respiration

2. Other symptoms

B. LATER SYMPTOMS

1.

2.

IX. HANDLING CASUALTIES

A. GENERAL DIRECTIONS

1. Exertion

2. Removal of clothing

3. Isolation of cases

4. Necessity of sleep

5. Warmth and fresh air

6. Complications

7. Artificial respiration

8. Antidote

X. RESPIRATOR

A. GENERAL DESCRIPTION

1. Purification of inhaled air

2. Discharge of exhaled air

B. DETAILS OF RESPIRATOR

1. Inlet valve

2. Canister

3. Trachea tube

4. The elbow tube

5. The flutter valve

6. Mouthpiece

7. Nose clip

8. Eye pieces

9. Face piece

10. Respirator case

C. SIZES

1. Small, medium and large

2. Fitting of mask

D. METHODS OF USE

1. How carried

2. Efficiency of chemicals

E. REPAIRS AND RECORDS OF USE

1. Local repairs

2. Record of use

F. REMOVAL OF RESPIRATOR DURING ATTACK

G. REASONS FOR MAJORITY OF CASUALTIES SINCE RESPIRATOR HAS BEEN IN USE.

1.

2.

3.

4.

5.

FURTHER NOTES

INSTRUCTIONS IN PRACTICAL ANTI-GAS WORK

oooooooooooo

GENERAL

The satchel containing toe box respirator is carried outside all other equipment, the strap over the right shoulder, the satchel on the left side. When away from the trenches it may be worn slung over the right shoulder. Men in the trenches or proceeding there must carry it slung on the chest, as in the "alert" position. The flap of the satchel with the press button must always be towards the body and the press button kept fastened except in an actual gas "alert". It is important that the methods described should be practiced by all who are equipped with the box respirator, to insure rapidity in adjustment and proper care in its use.

Men with perforated ear drums may be affected by the gas penetrating thru the ear passages to the respiratory organs and causing irritation there. In these cases it is useful to plug the ears with wadding. Commanding Officers should obtain from the Medical Officers of their units the names of those suffering from this disability, in order that the above precaution may be taken.

It must be remembered that the box respirator can be worked in gas for many hours on end without losing its efficiency or causing any distress. It may be breathed thru in drills for a period of a quarter of an hour per day for an indefinite time without impairing its efficiency.

The correct keeping of records as to hours of use of the box respirator, by entries in the small book forming part of the repair outfit, is of greatest importance, as these records form the only guide as to whether or not the boxes should be replaced. Decisions as to replacements should be made by the Divisional Gas Officer. The approximate time of actual breathing thru the box should be noted. These entries should always be made after gas drills and gas attacks, and great care should be taken that they are correct.

INSPECTIONS

Gas respirators must normally be inspected once a week and daily during "Gas Alert". It is of greatest importance that the inspection be carried out regularly and with greatest care. Any neglect in doing this may lead to loss of life.

INDIVIDUAL PRACTICE

In the initial training periods, drills must be arranged so that every man wears the respirator for one full period of half an hour without removing the mask or nose clip.

PRACTICE "A"

1. Adjustment of the box respirator in the "Alert" position.

2. On the command "Gas Alert" hang the box respirator around the neck with the press button next the body. With the right hand sieze the satchel by the leather tab; with the left hand sieze the sling by the brass button and clip this into the leather tab. Undo the press buttons closing the satchel.

The length of whipcord will then be withdrawn from the right hand compartment, passed thru the ring on the right of the satchel and carried around the waist to the ring on the left, where it is fastened. The press buttons closing the satchel will be left undone, but the flap will be put in position to keep the respirator from becoming wet.

PRACTICE "B"

Drill by members to obtain the correct adjustment of the box respirator.

NOTE: This drill is to be carried out alternately with one "judging the time" i.e. as quick adjustment as possible. It is most important that complete adjustment be obtained by all ranks in SIX SECONDS.

Adjust the respirator in the alert position with the satchel covered but not buttoned.

1. On the command "one" knock off the hat, press down both thumbs between the satchel and the body and open the satchel flap. Immediately sieze the mask with the right hand, the metal elbow tube just outside the mask being in the palm of the hand and the thumb and first finger grasping the metal frame of the nose clip.

2. On the command 'two" bring the mask smartly out of the satchel and hold it in both hands with all the fingers outside round the binding and the two thumbs inside, pointing upward and inward under the elastic. At the same time throw the chin well forward ready to enter the mask opposite the nose clip.

3. On the command "three" bring the mask forward, digging the chin into it and with the same motion bringing the elastic bands back over the crown of the head to the full extent of the retaining tape, using the thumbs.

4. On the command "four" sieze the metal elbow tube outside the mask, thumb to the right and fingers to the left--all pointing towards the face. Push the rubber mouthpiece well into the mouth and pull it forward until the rim of the mouthpiece lies between the teeth and the lip and the two rubber grips are held by the teeth.

5. On the command "five" adjust the nose-clip to the nose, using the thumb and the first three fingers of the right hand. Run the fingers round the mask on either side of the face to make sure that the edges are not folded over. Correct any fault adjustment. Come smartly to attention.

PRACTICE "C"

To adjust the respirator when carried over the shoulder and not in the alert position.

1. Sling the satchel around so that it hangs in front of the body. Undo the press buttons and adjust the mask as in practice "B", allowing the satchel to hang by the rubber tube.

2. After the nose piece is put on, at once proceed to adjust the satchel in the alert position, as in practice "A".

PRACTICE "D"

Drill to teach cleaning of eyepieces.

1. On the command "CLEAN EYEPIECES" the right eyepiece will be gripped between the thumb and first finger of the left hand. The first finger of the right hand will then be pushed gently into the mask fold which is behind the right eyepiece which will be cleaned with a gentle circular arm motion.

2. The left eyepiece will be cleaned in the same manner.

PRACTICE "E"

Drill to teach the method of giving orders.

1. It is first explained to a squad that the nose-clip must not be removed to talk and that before each sentence is spoken a long breath must be taken and the mouthpiece removed sideways from the mouth by turning the metal tube outside the mask to one side. After speaking the mouthpiece is replaced.

2. The squad should then be numbered off, extended to four paces and orders passed along the line.

Officers and noncommissioned officers will receive special care in practice "E".

PRACTICE "F"

Drill to teach the method of clearing the mask from gas which may have leaked in and is affecting the eyes.

1. Press the mask close to the face, forcing out foul air around the sides and then fill again with fresh air from the lungs by blowing out around the mouthpiece.

PRACTICE "G"

Drill to teach method of testing whether trench or dugout is free from gas.

1. With the right hand open the face-piece away from the cheek; then loosen the nose-clip on the nose and smell gently (do not take a deep breath). If the gas is smelt, the nose-clip and mask are replaced. Then as in practice "F".

PRACTICE "H"

Ordinary infantry drill will be carried out while wearing the mask which will include doing both double time for at least 200 yards at a time. Marching order will be worn.

NOTE:

(a) If after wearing for a long time, the pressure of the nose-clip becomes unbearable, it may be relieved for a few minutes by taking off the pressure without removing the clip.

(b) Removing masks. It must be seen that when masks are removed, that it is done without strain on the face or the elastic. On the command "TAKE OFF MASKS" insert the fingers of the left hand under the mask at the chin, bend the head forward, at the same time removing the mask with an upward motion of the left hand.

(c) After all drills the mask must be wiped dry, folded correctly, and put away in such a way that the rubber valve is not bent. Do not wipe off masks with handkerchiefs.

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MODERN FOREIGN ARMIES - STUDENT'S NOTES

THE BRITISH ARMY

I. Administration

a. The Army Council

1. Position

2. Composition

(a) The Secretary of State for War

(b) The Chief of the Imperial Staff

(c) The Adjutant General

(d) The Quartermaster General

(e) Master General of Ordnance

(f) Civil Master

(g) Finance Minister

b. The Imperial General Staff

1. Duties

2. Composition

(a) The General Staff Branch

(b) The Adjutant General's Branch

(c) The Quartermaster General's Branch

II. Organization

a. Type

b. Branches of the Army

c. Division of Infantry Units

UNIT	COMMANDER	
Army	General	3 Army corps and additional troops.
Army Corps	Lieutenant General	3-4 infantry divisions and corps troops.
Division	Major General	2 infantry brigades and divisional troops.
Brigade	Brigadier General	4 battalions
Battalion	Lieutenant Colonel or Major	4 companies
Company	Captain	4 platoons
Platoon	Sergeant or Lieutenant	4 sections
Section	Corporal or Sergeant	about 15 men

d. The Army

1. Size and distribution.

e. The Infantry Division

1. War Strength

2. Organization of an Infantry Division

1 Headquarters
3 Infantry Brigades
1 Headquarters for Divisional Artillery
3 Field Artillery Brigades (Field Guns)
1 Field Artillery Brigade (Howitzer)
1 Heavy Battery and Ammunition Column
1 Divisional Ammunition Column
1 Headquarters for Divisional Engineers
2 Field Companies (Royal Engineers)
1 Signal Company " "
1 Cavalry Squadron
1 Divisional Train
3 Field Ambulances

f. The Regiment

1. General Note

g. The Company

1. Organization

2. War Strength

III. Service

a. Enlistment Period

IV. The British Air Service

a. Administration

1. Commanding Officer

2. Staff

b. The Brigade

1. Commanding Officer; location of HQ

2. Organization

c. The Army Wing

1. Duties

2. Organization

d. The Corps Wing

1. Duties

2. Organization

e. The Squadron

1. Organization

f. The Flight

1. Duties

g. Cooperation with Artillery

1. Duties of Artillery Flights

h. Similarity of other Air Services

i. Chart.

THE FRENCH ARMY

I. Administration

a. War Minister, Staff, etc.

II. Organization

a. General Remarks

b. Division of Infantry Units

UNIT	COMMANDER	COMPOSED OF
Army Corps	Lieutenant General	2 infantry divisions and corps troops
Division	Lieutenant General	2 infantry brigades and divisional troops
Brigade	Major General	2 infantry regiments
Regiment	Colonel	3 battalions
Battalion	Major	3 companies
Company	Captain	4 sections
Section	Lieutenant	2 Half-Sections

c. The Army Corps

1. Organization

2 Infantry Divisions
1 Cavalry Brigade
1 Horse and Field Artillery Brigade
1 Squadron of Pioneers (Engineers)

d. The Company

1. Organization

e. Branches of the Army

The Regular (or Active) Army
The Reserve of the Regular Army
The Territorial Army
The Territorial Reserve

f. Peace Strength of the French Army

III. Service

a. Method of obtaining men

b. Service in the Branches of the French Army

Regular Army	3 years
Reserve	11
Territorial Army	7
Territorial Reserve	7
Total -	28 years

c. Active service in each branch

d. Officers

IV. The French Air Service

THE GERMAN ARMY

I. Administration

a. General Remarks

b. The Kaiser

c. War Ministers

d. Prussian General Staff

e. The Prussian Great General Staff

f. Appointments

1. Chief of the Prussian Military Cabinet

2. Prussian Minister of War

3. Officers of the Great General Staff

4. Army Corps Commanders

5. Army Inspectors

II. Organization

a. Branches of the Army

Active or Regular Army
Reserve
First Landwehr
Second Landwehr
Landsturm
Ersatz

b. The Army Corps

c. Division of Units

d. The Division

1. Organization

The Infantry Division is composed of the following units
2 Brigades of Infantry
1-2 Pioneer Battalions
1 Brigade of Field Artillery
3-4 Squadrons of Cavalry

2. War Strength

e. Peace Strength of the Army

III. Service

a. Method of obtaining men

b. Liability to Service

c. Service in each Branch

d. The Ersatz

e. Volunteers

IV. The German Air Service

THE ITALIAN ARMY

I. Organization

a. Branches of the Army

1. Permanent Army

2. Reserve

3. The Mobile Militia

4. Territorial Militia

b. Units

1. The Field Army

2. The Army Corps

3. The Infantry Division

2 infantry brigades
1 regiment of field artillery (5 batteries)

4. Additional units -

II. Service

a. First Category

? years for all arms in the Permanent Army
6 years in the Reserve
4 years in Mobile Militia
7 years in the Territorial Militia
Discharged at the age of 39.

b. Second Category

c. Third Category

III. General Remarks

a. Peace strength

b. Colonial troops

IV. Italian Air Service

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INSTRUCTIONS TO CADETS

I. TOOL CHECKS

1. One hour has been scheduled during the week of Squadron "A" for drawing tool checks from the Tool Room in the Aeronautical Laboratories. At this hour the commander of Squadron A will proceed to the Tool Room and draw tool checks for his entire squadron. Six checks will be issued to each man, each check being stamped with the same number as on the identification button worn by the man who receives it. These checks are to be given in exchange for tools and books and are returned when the material drawn is turned in. Care should be taken to see that material drawn out on tool checks is returned in as good condition as when received. Any damage or breakage will be charged to the cadet responsible. For rules regarding tool checks see General Order No. 2 accompanying these instructions.

II. NOTES AND REFERENCES FOR LECTURES

1. At the first hour scheduled for drawing material from the Tool Room or as soon as possible thereafter, each member of Squadron A will personally secure a copy of each of the following books:

U.S. Army Regulations, 1917, with all available changes.
Manual for Courts Martial, 1917.
Infantry Drill Regulations.
Manual of Interior Guard Duty.

2. At this same hour the Squadron Commander will draw for each member of his Squadron one copy of the following mimeographed lecture notes. He will then see that each man is in possession of a copy of the proper notes at each hour when the Squadron assembles for a lecture. Cadets who fail to receive a copy of any set of notes should notify the Squadron Commander immediately.

Military Courtesy and Ideals
Administration and Organization of the U.S. Army
Army Regulations
Military Hygiene, Sanitation and First Aid
Military Law
Army Paper Work
Methods of Modern Warfare
Guard Duty

III. BOOKS TO BE PURCHASED.

1. Each cadet will provide himself with a number 6-C cloth bound, stiff covered, 3-ring, loose leaf note book, in which to keep his lecture notes. This binder may be used for the notes furnished by all departments. It may be obtained at the Students Co-operative Store on the University campus, or at any nearby stationery store.

2. It is highly recommended that each cadet purchase for his personal use a copy of Colonel Moss' book "The Officers' Manual". This is a book which will prove of great help to a newly appointed officer, and a valuable reference book on military matters at all times.

IV. USE OF LECTURE NOTES

1. The notes on many of the lectures given in the several departments of the School have been prepared in mimeographed form. In some cases headings and principal topics only have been given, but considerable space has been left between the lines, in order that the cadet may insert all of the details and points discussed, each under its proper heading. The lectures will in general follow the notes issued, taking up the topics in the order given.

2. The importance of taking complete and concise notes cannot be overestimated. No man should trust to his memory for the subjects discussed in the lectures.

V. INSTRUCTIONS GOVERNING EXAMINATIONS IN ALL SUBJECTS.

1. These instructions apply to all examinations written on the regular examination paper furnished by the School of Military Aeronautics and should be carefully noted particularly before each final examination. A lack of observance of these rules will result in a delinquency report.

2. Cadets will take alternate seats (one chair between) in the examination room.

3. No notes or books of any kind will be brought into the room. (Does not apply to quizzes given during a lecture hour.)

4. All questions concerning the examination will be asked aloud, the cadet rising from his seat and obtaining permission to speak, but not moving about the room without the consent of the instructor in charge.

5. All headings on the examination paper will be filled out. The name will be written with the surname first, as Doe, John F. The name should be written legibly. The headings may be lettered if the cadet desires.

6. Write in ink. Be sure that the fountain pen is filled before coming to an examination.

7. Leave suitable margins; about one inch on the left and one half inch on the right.

8. Tabulate the answers whenever possible.

9. Use good English and spell correctly.

10. Be neat.

11. Write on both sides of the paper, and number the pages in consecutive order, as the pages of a book are numbered. For final examinations double folded sheets are furnished. Extra sheets are single and are numbered 5, 6, 7, etc., and will be placed inside of the double sheet before handing in the paper.

12. Do not write out the question but number it exactly as the instructor has numbered it, using Roman numerals (written in the center of the sheet) for the number of the question, and Arabic numerals or letters (written at the side) to denote the different parts or sections of a question.

13. Read the question over several times before attempting to answer it. Be sure that the meaning of the question is thoroughly understood.

14. If a mistake has been made in answering a question do not attempt to erase the error but place brackets around the word or sentence which it is desired to omit and write the word "OMIT" in such a way that the reader can tell which part of the answer should not be graded.

15. After finishing the examination the answers should be read over carefully to see that none of the parts or sections of any of the questions have been omitted.

16. Remember what has been said about absolute honesty in examinations.

17. It should be borne in mind that the final examination paper of each cadet goes to Washington to form a part of his permanent record, and consequently should represent his best effort in every respect.

18. Cadets ordered to take a re-examination in any subject will report at the next hour scheduled for the examination in that subject and will omit any conflicting lectures given to the squadron in which the cadets are enrolled.

VI. COURTESY TOWARD CIVILIAN INSTRUCTORS

1. The following requirements concerning the rendering of salutes to civilian instructors have been approved by the Commandant:

2. Salutes will be exchanged between cadets and civilian instructors upon all official occasions of meeting, such cases being held to include:

a. Reporting the squadron to the instructor in the classroom. (Squadron Commander only.)
b. Being addressed by an instructor outside of the classroom.
c. Addressing the instructor outside of the classroom.

3. In rendering the report of the squadron in the classroom the squadron commander will salute once, then report.

4. When addressing an instructor, or when being addressed by an instructor, outside of the classroom, the cadet will salute at the beginning of the conversation and will salute again at the end of the conversation.

5. Salutes will not be exchanged between cadets and civilian instructors upon occasions other than those above prescribed.

VII. GENERAL ORDERS.

1. Copies of General Orders No. 1 and No. 2 are included in these instructions for the information and guidance of all cadets. They should be read and their contents noted carefully.

(G.O. 1.)

GENERAL ORDER, U.S. School of Military Aeronautics,

No. 1. Berkeley, March 13th, 1918.

1. The following extract from War Department General Orders No. 21, 1918, is published for the information of the commissioned, enlisted, and civilian personnel of this command:

2. "All persons connected with the military service, who receive information of proposed inland or oversea movements of organizations, detachments, or individuals, are forbidden to make public the details of such movements.

"The names of organizations, dates of departure, arrival, or of embarkation, or of the ships to be used in such movements, will not be disclosed.

"When necessary to advise relatives or other private persons of approaching departure, persons connected with the military service will convey only information absolutely necessary, which will not include rail routing or probable time of arrival at any station or dates, or names of ships, or ports of departure, or the destination of organizations.

"The marking of cars or of baggage so as to indicate an over-sea destination, the date of departure, or the name of the ship which is to sail will be avoided. Baggage for oversea shipments will be addressed to the quartermaster of the port of embarkation and information furnished the quartermaster as to the disposition to be made of it.

"After arrival in France or England no information will be given concerning the names of organizations arriving; destinations of organizations, names of vessels, information concerning convoys, routes pursued, measures taken to avoid attack, dates of arrival, debarkation or departure, numbers of troops, or character of cargoes carried.

"Officers and men will avoid talk or discussion with reference to military matters while in any public place. After joining the American Expeditionary Forces all officers and men will view with suspicion any person asking questions about military subjects or discussing such topics where there is a possibility, however remote, of such information reaching the enemy.

"Commanding Officers of all vessels carrying troops to join the American Expeditionary Force will cause this order to be published en route to all persons in the military service.

"Violations of the provisions of this order will be investigated and disciplinary measures applied to offenders."

3. Too much emphasis cannot be placed upon the importance of not giving out any military information whatever, either that received at this school or elsewhere.

Very few persons in the military service are competent to judge whether such information will or will not be of value to the enemy. It is necessary, therefore, that the utmost precaution be observed with regard to all information of a military character.

BY ORDER OF MAJOR HUNTER:

CHAS. B. CRANE,
Captain, Sig. R.C., A.S., Adjutant.

(G.O. 2.)

GENERAL ORDER, U.S. School of Military Aeronautics,

No. 2. Berkeley, April 11th, 1918.

1. The attention of all cadets is directed to the following procedure for obtaining books or other materials from the Tool Room on tool checks, and the rules outlined below will be rigidly enforced.

2. No cadet can graduate without having obtained a "clearance receipt" from the Tool Room Keeper.

3. To obtain a clearance receipt, all books or other material taken out on tool checks must be turned in to the Tool Room Keeper, or lost articles paid for, and the tool checks themselves must be returned.

4. In the case of cadets relieved from instruction all mimeographed notes, maps, conventional sign cards and all longhand notes by the cadet himself must also be turned in.

5. Six tool checks are given to each cadet when he enters "A" Squadron.

6. Each cadet should note and remember the number on his checks.

7. One tool check must be deposited with the Tool Room Keeper for each book or each tool taken from the Tool Room.

8. When the cadet returns a book or tool to the Tool Room, the check deposited for the article will be returned to him.

9. Lost tool checks must be paid for at the rate of $1.00 for each check lost.

10. Books, out on tool checks, which are not returned must be paid for according to the price list posted in barracks.

11. Tools or other equipment, out on tool checks, which are not returned must be paid for.

12. It should be emphasized that a lost tool check may cost the man to whom the check was issued several dollars instead of one dollar, the value of the check itself. If a lost check is found and the finder is inclined to do so, he might succeed in obtaining an expensive book or piece of equipment from the Tool Room on this check, and the person to whom the check was originally issued will be held responsible.

13. Lost checks should be reported to the Tool Room Keeper immediately.

14. From the above it is evident that each cadet should keep careful record of his tool checks and all material taken from the Tool Room on tool checks.

BY ORDER OF LIEUT. COL. HUNTER:

CHAS. B. CRANE,
Captain, Sig. R.C.; A.S., Adjutant.

UNITED STATES
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY

June 1918

MEMORANDUM:-

PERSONAL EQUIPMENT SUGGESTED TO BE TAKEN TO FRANCE

1. The following list of arms, equipment and clothing should be in the possession of an officer in field service in France. This list is based on the Table of Fundamental Allowances, Quartermaster Supplies; Uniform Regulations; and Circular of Information issued from Headquarters, American Expeditionary Forces, dated November 14, 1917; and actual experiences.

ARTICLES	NUMBER	REMARKS
Basin, canvas	1	Sold, not issued to officers.
Bedding roll or a combination bedding-clothing roll	1	Do.
Belt, saber, garrison	1	Do. For officers equipped with the saber. Sec. par.65, S.R.No.41 (U.R.). Circular, headquarters American Expeditionary Forces, states "In addition to the prescribed field belt, the Sam Browne belt with single sling, will be needed by all officers. The proper type may be obtained in France. "Also see Bull. No.79, W.D., 1917." NOTE:- The Sam Browne or "Liberty Belt" is not authorized to be worn in this country.
Belt, waist	1	Sold, not issued to officers.
Blankets, olive drab	3	Do.
Breeches, woolen, pairs	2	Circular, American Expeditionary Forces states clothing could include heavy and medium weight. Sold to officers.
Bucket, canvas	1	Sold, not issued to officers.
Canteen, with cover and strap	1	Issued by Ordnance Department on menorandum receipt.
Cap, service	1	Circular, American Expeditionary Forces. Sold to officers.
Clothing roll	1	Sold, not issued to officers. Not required when combination clothing-bedding roll is used.
Coat, service, woolen	2	Circular, American Expeditionary Forces, states clothing should include heavy and medium weights. Sold to officers.
Collars, linen, white	12	Circular, American Expeditionary Forces. Sold to officers.
Comfortable	1	Do.
Compass	1	Sold to officers. Headquarters, American Expeditionary Forces suggests illuminated dial.
Cuffs, linen, white, pairs	6	Circ., HQ A.E.F. Sold to officers.
Cup	1	Issued by Ordnance Dept. on memorandum receipt.
Drawers, pairs	4	Sold. Circ., HQ A.E.F., states heavy wool and cotton.
Field glasses	1	Sold, not issued to officers.
First-aid packet, with pouch	1	Packet supplied by Medical Dept., pouch by Ordnance Dept.

ARTICLES	NUMBER	REMARKS
Flashlights and extra batteries	1	Circ., HQ A.E.F.
Fountain pen, paper and envelopes	1	Do.
Gloves, riding, pair	1	Sold. Circ., HQ A.E.F.
Gloves, woolen, olive drab, pair	1	Sold. Not issued to officers.
Handkerchiefs	12	Sold. A number should be of Olive drab color.
Haversack, with pack carrier	1	Containing meat can, knife, fork and spoon. Obtained from Ordnance Dept. on memorandum receipt.
Laces, shoe, extra, pairs	4	Sold, not issued to officers.
Leggins, russet leather, pigskin, pair	1	Do.
Locker, trunk	1	Do.
Moccasins, pair	1	Reaching to ankle; large enough to wear two pairs of wool stockings worn in rubber boots; Circ., HQ A.E.F.
Notebook and pencils	1	Sold; not issued to officers.
Overcoat, olive drab	1	Do. Commanding officers may authorize in the field only a short, double-breasted overcoat. (See par.103, S.R. No. 41, U.R.) Officers may wear waterproof capes or overcoats, as nearly as practicable to the color of the service uniform, when on duty involving exposure to rainy or other inclement weather. (See par. 124, S.R.No. 41, U.R.) In France the overcoat is worn of knee length. Circ., HQ A.E.F. states it is desirable to have the overcoat well lined. (See "Slicker")
Pistol, with holster	1	Issued in France; not issued in the United States to officers not serving with troops.
Pistol, belt	1	Do.
Portfolio, leather	1	For officers habitually carrying papers; sold.
Saber and scabbard	1	Circ., HQ A.E.F. states required only by cavalry officers on duty with troops armed with the saber. Sold; not issued.
Saber knot	1	Sold; not issued to officers. (See the remark above concerning the wearing of the saber in France..
Shirts, flannel, olive drab	3	Sold; not issued to officers
Shirts, cotton, olive drab or linen	4	Sold; Circ., HQ A.E.F.
Shoes, high, russet leather	2	Sold; not issued to officers . Circ., HQ A.E.F. states that two pairs of shoes are required for wear inside Arctic overshoes; and also the following are required;- 2 pairs very heavy field shoes or trench boots, large enough to take heavy wool stockings. These boots should be laced in the instep, and said boots may be worn by all officers at all times. Those laced all the way up are authorized, but in cities they may be worn only in inclement weather. Mounted officers may wear boots of russet leather. See par. 67, S.R. 41.

ARTICLE	NUMBER	REMARKS
Slicker	1	Sold to officers. Circ., HQ A.E.F. state: "it is advisable that the slicker have a detachable lining of heavy wool or fleec The overcoat and raincoat (slicker) for officers in the trenches should be of th same appearance as those worn by the men The English trench coat is satisfactory, provided it can be obtained. It answers the combined requirements of overcoat and raincoats and has a lining that can be worn separately." NOTE:- A trench coat very similar to the one above described is manufactured by Adler Bros. and Co. or Rochester, N.Y. and one is on sale at the Army and Navy Cooperative Store. It is thought that there are several manufacturers who make them. Correspondence with the Depot Quartermaster, New York will secure names of possible manufacturers.
Stockings, pairs	6	Sold, not issued to officers. Circ., HQ A.E.F. states that cotton and heavy wool underwear are required and particularly indicates that heavy weight wool stockings are needed. To meet these requirements the number indicated should be increased; at least doubled.
Tag, identification	2	Sold, not issued to officers.
Tape, for identification tag, yards	1	Do.
Toilet articles		Including brushes, hair and tooth, comb, razor and soap. Sold; not issued to officers.
Towels	6	Including bath towels; sold.
Undershirts	4	Sold, not issued to officers. Circ., HQ A.E.F. states that cotton and heavy wool underwear are required, so this number should be at least doubled.
Watch	1	Sold to officers by Signal Corps.
Whistle	1	Issued by Quartermaster on memorandum receipt.

Mounted officers should provide themselves with spurs, until the new model mounted equipment is available in quantity, mounted officers are authorized to obtain horse equipment from the Ordnance Department on memorandum receipt. Officers not serving with troops should obtain this horse equipment after arrival abroad.

Officers entitled to ordnance equipment under this Bulletin, will obtain it on memorandum receipt from their company or detachment commanders, in case of company officers, or from the unit supply officers, in case of field and staff officers or organizations. Companies or attachments will obtain such equipment from unit supply officers in the same manner as they obtain articles for the equipment for enlisted men.

Unit supply officers will obtain such equipment from the nearest Ordnance Depot, arsenal, or other ordnance establishment in a similar manner to that of obtaining other equipment for their organizations and will be accountable for it.

Where necessary, individual officers attached to, but not serving with any organization of a regiment, separate battalion, field hospital, ambulance company, or other tactical organizations for which equipment is prescribed may obtain the equipment in question on memorandum receipt directly from the unit supply officer.

Staff officers serving at other headquarters will obtain all such equipment on memorandum receipt from an officer at each headquarters designated by the general in command to receipt and account for such property.

Should an officer to whom such equipment has been issued by a Post, camp or depot ordnance officer fail to turn it in prior to his leaving such station, the accountable officer may certify a list of same to the Chief of Ordnance that its cost may be stopped against the officer concerned.

The Depot Quartermaster in New York will furnish, on application, officers wit a list of manufacturers of clothing and equipment. Upon request of officers the manufacturers on such list will forward to them a price list and will deliver clothing and equipment to officers ordering same collecting from the officers the wholesale price for the articles furnished.

A great many articles are on sale in the commissaries established by the American Expecitionary Forces. These articles include breeches, whipcord; drawers, wool trench coats with detachable linings (suitable as overcoat and raincoat); undershits wool; boots, rubber, hip; shoes; matches; shaving outfits; soap; towels, bath.

Uniforms can be purchased abroad at about the same rates as in the United States. Shelter tents complete are issued to company officers as part of company equipment.

American tobacco and cigarettes, etc. are desirable, but unnecessary items to add. Leather goods of any description are extremely high priced and often very difficult to obtain in France. An extra pair of boots or shoes might therefor be bought to advantage.

The above list of articles are best transported in an officers trunk locker, and bedding roll. These should be plainly marked in large letters with the officer's name. Tags come off and are not sufficient identification. In any case baggage should not exceed 150 pounds weight.

Cadets should keep this list in view, gradually accumulating the required articles and disposing of unnecessary articles already in their possession.

Cadets will take with them from this School such articles contained herein as have been issued to them and the small amount of clothing (excepting overcoats and raincoats) now in their possession. It is suggested that Cadets defer purchasing issue articles which are not now required until need for them becomes apparent.

BY ORDER OF LIEUTENANT COLONEL HUNTER:

Charles B. Crane
Captain, A.S. Sig. R.C.
Adjutant.

UNITED STATES
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY

MILITARY SUBJECTS DEPARTMENT

ARMY PAPER WORK AND SQUADRON ADMINISTRATION
(STUDENT'S NOTES)

SOURCES OF INFORMATION

A. MANUALS PUBLISHED BY THE WAR DEPARTMENT.

1. United States Army Regulations

   a. Subject matter

   b. Changes

   c. Importance of keeping Army Regulations posted

2. Manual for Courts-martial

   a. Subject matter

3. Military Laws of the U.S.

   a. Subject matter

4. Digest of Opinions of the Judge Advocate General

   a. Subject matter

5. Compilation of General Orders, Circulars and Bulletins of the War Dept.

   a. Subject matter

6. Infantry Drill Regulations

a. Subject matter

b. Changes

7. Field Service Regulations

a. Subject matter

8. Manual for Non-commissioned Officers, and Privates of the Infantry

a. Subject matter

9. Manual of Interior Guard Duty

a. Subject matter

10. Rules of Land Warfare

a. Subject matter

11. Securing the publications

B. WAR DEPARTMENT PUBLICATIONS

1. Special Regulations

a. Subject matter

b. Manner of issuing

2. General and Special Orders, Circulars and Bulletins

a. The subjects covered

3. Confidential pamphlets

a. How compiled

b. Subjects covered

c. How issued

4. Tables

a. Tables of organization

b. Army pay table

5. Securing the publications

C. MIMEOGRAPHS

1. By whom published

2. Use

3. Examples

D. PUBLICATIONS OF STAFF CORPS

1. Manuals

a. General remarks

b. Manuals of the S ignal Corps

E. PRIVATE PUBLICATIONS

1. Subjects

2. Reliable

ORDERS, BULLETINS AND CIRCULARS - INTRODUCTION

A. TYPES OF ORDERS DEFINED.

1. General and Special Orders

a. Definition

2. General Orders

a. Definition

3. Special Orders

a. Definition

4. Orders

a. Definition

5. Field Orders

a. Definition

b. Manner of issuing

6. Bulletins

a. Definition

7. Circulars

a. Definition

B. FORM OF ORDERS

1. General and Special - Printed

a. Source from which the order emanates

b. The date

c. Classification and number

d. The margin

e. Size of the paper

f. Substance and paragraphing

g. Signing of orders

2. Form of company order

a. Source

b. Date

c. Spacings in general

d. Substance and paragraphing

e. Signature

3. Form of field order

C. MANNER OF ISSUING ORDERS

1. Numbering of orders

2. Typographical errors

3. Distribution of War Department orders

4. Manner of filing the form

5. General

D. PRACTICE AND DEMONSTRATION OF FORMS

1. Examples

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ARMY PAPER WORK AND SQUADRON ADMINISTRATION

(STUDENT'S NOTES)

- - -

MILITARY CORRESPONDENCE

INTRODUCTION

1. Meaning and extent of Army Paper Work -

2. References -

   a. Engineer Training Manual, Appendix #2 -

   b. Officer's Manual by Moss -

   c. Army Paper Work by Moss -

   d. Army Regulations (Corrected to date) -

   e. General Order No. 23, 1912 -

A. CHANNELS OF COMMUNICATION

1. Why mentioned in connection with correspondence -

2. Military channels defined -

3. Regulations as to intermediate commanders -

4. Channels for Staff Departments on questions of organization and administration -

5. Channels for Staff Departments on questions of military law, pay, discipline, sanitation, shelter, supply, and equipment (not technical), etc. -

6. Channels for organized divisions of R.A., N.G., N.A., A.E.F. -

7. Position of the Adjutant General in military channels.-

8. Correspondence between Staff Departments -

9. Channels for a cadet in this school -

10. General remarks as to channels -

B. THE FORM AND COMPOSITION OF A MILITARY LETTER

Introduction -

The Brief
The Body
The Signature
The Indorsements
The Enclosures.

1. THE BRIEF

a. Margins -

b. Spacing -

c. The Place of writing -

d. The date -

e. The File Number -

f. The word "From:" -

g. The word "To:" -

(1) Addressing by office held -

(2) Addressing by name, rank & organization -

(3) Titles of officers addressed (or writing) -

(4) Designation when letter is to go through military channels -

h. The word "Subject:" -

2. SALUTATIONS

3. THE BODY

a. Margins -

b. Spacing -

c. Indentation of paragraphs -

d. Numbering of paragraphs -

e. Beginning the body -

f. Subject matter -

4. COMPLIMENTARY CLOSINGS

5. SIGNATURE

a. Location -

b. Signing by name only -

c. Signing with name, rank & organization -

d. Personal Signature of commanding officer -

e. Signature of a Staff Officer - (for the Commanding Officer) -

(1)

(2)

(3)

6. INDORSEMENTS

Definition -

a. Margins -

b. The Heading -
Contains:
(1)
(2)

(3)
(4)

c. Spacing -

d. Indentation of paragraphs -

e. Numbering of paragraphs -

f. Numbering of indorsements -

g. Remarks -

h. Signature -

i. Additional pages -

7. NUMBERING OF PAGES

8. FOLDING THE LETTER

a. Single sheet -

b. More than one sheet -

9. ENCLOSURES

a. Numbering -

b. Record of enclosures with original communication -

c. Record of enclosures with indorsements -

d. Folding of enclosures -

e. Headquarters stamps -

10. COPIES

a. Number -

b. Copy retained -

c. Copy forwarded -

GENERAL NOTES ON MILITARY CORRESPONDENCE

1. ANSWERING OF COMMUNICATIONS

2. CONFIDENTIAL INFORMATION

3. PENALTY ENVELOPES

a. Characteristics -

b. To make a penalty envelope -

c. Writing to civilians -

d. Not for foreign mail -

4. STAMPS

5. EXPRESSIONS USED IN LETTERS

a. "The Commanding Officer desires" -

b. "Calling attention to" -

c. "Inviting attention to" -

d. Personal pronbuns -

TELEGRAMS

1. CHARACTERISTICS OF A WAR DEPARTMENT OFFICIAL TELEGRAM

a. The number.
b. The place from which sent.
c. The date
d. Statement of the Quartermaster General to the Telegraph Co.
e. The Certificate -

f. Signature of the officer sending the message -

g. Notation of rate -

h. "Government Paid" -

i. "Notice to sending operator" -
(1)

(2)

2. MANNER OF CONVERTING COMMERCIAL FORM TO OFFICIAL FORM

a. Add the statement -

b. Mark -

c. Instructions to operator -

3. GENERAL REGULATIONS FOR TELEGRAMS

a. Night Letters -

b. Official copies by mail -

c. Serial number -

d. Numbers -

e. Enlisted men -

f. Punctuation marks -

g. Telegrams not government paid -

h. When to use telegrams -

FILING SYSTEM FOR CORRESPONDENCE

1. FILES REQUIRED IN A COMPANY OFFICE

a. Document file -

b. Correspondence file -

2. USE OF THE CORRESPONDENCE BOOK

a. The index of correspondence book -

b. The briefs of communications -

c. Data briefed in a paragraph in correspondence book -

1.
2.
3.
4.
5.
6.

d. Demonstration -

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1. AVOIDING PAPER WORK

a.

b.

2. CARELESSNESS

a.

b.

c.

d.

3. STATEMENTS OF ENLISTED MEN

a.

4. CHARGE OF NEGLECT OF DUTY

a.

The Military Letter (8x10½) MS509

HEADQUARTERS

137th FIELD ARTILLERY U.S.N.G.

File No. 463.7

Kansas City, Mo.,
Oct. 24, 1917.

From: Commanding Officer

:Margin: :Margin
: : To: Commanding General, Central Department, Chicago, Ill. :
:1¼inch: :1 inch

Subject: Authority for expenditure - rental of quarters.

(Fold Here)

1. This regiment was organized immediately before the call of the National Guard into Federal Service. The quarters furnished by the State of Missouri were ample but arrangements were made for only six weeks after muster. It has become necessary to vacate those quarters; and now Headquarters, Headquarters Company, Supply Company, Medical Detachment and two Batteries are without quarters.

2. Responsibility has been assumed for the quartering of this command, and it is now housed until the 28th of October in the Sweeney Automobile School, 24th and Wyandotte Avenue, Kansas City, Mo., at $10 per day.

3. Authority is requested to pay $10 per day for present quarters in view of the extreme economy of the charge, and on account of lack of tentage or other means of caring for men.

4. Enclosed is a statement of the Sweeney Automobile School, certifying that the quarters were occupied by this regiment as above stated.

(Fold Here) 1 incl.

(Signed) John F. Henry
(Typewritten) John F. Henry
Colonel, F.A.

652-CR-137 F.A.N.G. 1st Ind.

H.Q. CENTRAL DEPT., CHICAGO, Oct. 28, 1917 - To the Quartermaster General of the Army - Recommended in view of the reasons given, that the expenditure for rental of quarters be approved and that funds be made available therefore.

(Signed) Ralph W. Smith
(Typewritten) Ralph W. Smith,
Lt. Col., U.S.A., Retired,
Acting Dept. Adjutant,
In absence of Dept. Commander.

MS509

75.4 2nd Ind.

O.Q.M.G., Oct. 28, 1917 - To the Department Commander, Central Dept., Chicago, Ill. Returned approved for expenditure of $60.00, chargeable "Barracks & Quarters, 1917-18, Act of June 15, 1917".

By authority of the Quartermaster General.

1 Incl.

(Signed) Geo. B. Brown,
(Typewritten) Geo. B. Brown
Major, Q.M. Corps

652-C.R.-137 F.A.N.G. 3rd Ind.

H.Q. CENTRAL DEPT., CHICAGO, Nov. 2, 1917 - To the Commanding Officer 137th F.A.N.G., Kansas City.

1. Attention invited to the preceding indorsement.

2. Submit to these headquarters for payment, certificd vouchers to cover the amount.

3. A copy of this indorsement must also be filed with the account.

By command of Major General Carter.

(Signed) Ralph W. Smith,
(Typewritten) Ralph W. Smith,
Lt. Col., U.S.A., Retired,
Acting Dept. Adjutant.

etc.

Sweeney Automobile School,
24th & Wyandotte Avenue,
Kansas City, Missouri,
October 18, 1917.

To whom it may concern:

This is to certify that the buildings of this school have been in use as quarters for the 137th Field Artillery, U.S.N.G., since September 12, 1917, and that the rental price agreed upon for this service is $10 per day.

(Signed) James F. Sweeney,

President.

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- - -

MILITARY SUBJECTS DEPARTMENT

- - -

ARMY PAPER WORK AND SQUADRON ADMINISTRATION
(Student's Notes)

- - -

FORMS ASSOCIATED WITH THE SERVICE OF AN ENLISTED MAN AND A COMMISSIONED OFFICER.

- - -

INTRODUCTION

1. The extent of forms -

2. General data necessary for complete knowledge of forms - order of discussion - .

3. Manner of studying forms -

4. References for this phase of paper work -

A. SERVICE RECORD

1. Definition.

2. Manner of using the form

3. Copies and disposition.

4. Common characteristics of the form.

5. Information and instructions to complete the form.

a. Opening of record by recruiting officer -

b. Report of Assignment -

c. Military Record -

6. Clothing Account -

a. Clothing drawn - gratuitous issues of clothing - clothing settlements -

b. Individual Equipment Record -

7. Allotments.

a. Voluntary allotments -

b. Compulsory allotment -

8. Deposits.

a. A system to facilitate savings by enlisted men -

9. Indorsements.

a. When used -

b. Information given in the indorsement -

10. General instructions for completing Service Record.

a. Records required by the Company Commander -

b. Changes in entries -

c. Initialling of entries -

d. Negative entries -

e. Special regulations from Bulletin No. 8 - 1918.

f. Procedure in the case of the Lost Service Record -

g. Data to be entered upon Service Records of selected man -

B. DEPOSIT SYSTEM - SOLDIER'S DEPOSIT BOOK - ADVICE OF DEPOSIT -

1. References -

2. Definition of the system -

3. Regulations for deposits.

a. Rate of interest -

b. Minimum deposit -

c. Drawings on deposits -

d. Paying of deposits -

e. General -

f. Liability of deposits -

4. Manner of making Deposit.

5. Instructions to complete the receipt for deposit.

6. Instructions to complete advice to Soldiers' Deposits.

C. FURLOUGH

1. Definition.

2. References.

3. Manner of using the form.

4. Copies and disposition.

a.

b.

5. Instructions to complete the form.

a. Authority for granting -

b. Name, Grade, Organization of man -

c. Date set for departure -

d. Date set for return -

e. Destination on Furlough -

f. Where to report upon return -

g. Signature of issuing authority -

h. Memorandum of Pay and Rations -

i. Description of Soldier -

j. Certificate of Transport Quartermaster -

k. Date of return to duty -

l. Place of return to duty -

m. Report of Discharge, and authority -

n. Accounting for rations -

o. Signature of commanding officer -

p. Commutation of rations -

q. The fourth page -

D. CERTIFICATE OF DISABILITY FOR DISCHARGE

1. References.

2. Definition.

3. Copies and disposition.

4. Manner of using the form.

a.

b.

c.

d.

E. DISCHARGES

1. References.

2. Definition.

3. Regulations for the use of the form.

a. Signing the discharge -

b. Number of copies -

c. Special notations -

d. Remarks with regard to character -

4. Information and instructions to complete the form.

a. Filling out the form -

b. Honorable discharge -

(1) Face of the form -

(2) Reverse side of the form -

c. Dishonorable Discharge -

d. Discharge (straight) -

F. FINAL STATEMENT

1. References.

2. Definition.

3. Copies and Disposition.

4. Manner of using the form.

5. Regulations for the use of the form.

a. General regulations -

b. Responsibility of certifying officer -

c. Travel allowances -

d. Repeated data on Final Statement to agree with that on Discharge Certificate -

6. Instructions to complete the form.

a. Due soldier -

b. Due the United States -

c. Remarks -

d. Amounts written -

e. Use of the third fold on the face of the form -

f. List of Deposits -

g. For detailed instructions -

G. NOTIFICATION OF DISCHARGE

1. References -

2. Definition.

3. Copies and disposition.

4. Regulations for use of the form.

5. Instructions and information to complete the form.

FORMS ASSOCIATED WITH THE SERVICE OF AN OFFICER

A. MILEAGE VOUCHER:

1. References

2. Definition

3. Copies and disposition

4. Submitting the voucher

a) The Voucher

b) Designation of payee

c) Items on the voucher

1. "From"

2. "To"

3. "For Mileage From"

4. "To"

5. "Transportation furnished between"

d) Certificate of Correctness

e) The Second Page

Data following the words "TO", "ADDRESS" and PLACES OF ARRIVAL AND DEPARTURE, DATES AND NOTATION FOR TRANSPORTATION

f) Orders for Travel

g) Computation of allowance

h) Indorsement not permitted

B. OFFICERS' PAY VOUCHER

1. References

2. Definition

3. Regulations for computation of pay.

a) See notes under pay of officers in lecture on regulations.

b) Basis per month

c) Orders affecting pay

d) Sources of information for allowances and pay according to grades-Army Pay Tables

e) Explanation of system of zones

f) Daily pay of officers

4. Information and instructions to complete the form.

a) "For pay from"

b) "For pay for--mount"

c) "For comm. of heat and light"

d) "For comm. of quarters"

e) "Under authority of S.O. No."

f) Deductions for war risk insurance, liberty bonds, allotments for dependents (for overseas officers), etc.

g) Deductions for leaves

h) Amounts

i) Information to appear on the second sheet

j) Location of quarters and number of room occupied

k) The receipt

l) Information for income tax

5. Manner of using the form.

a) Additional information to be given with the first pay voucher submitted:

b) Enclosures to accompany first voucher submitted and others in which a change of pay is noted.

c) The form completed will be --

d) Indorsement

e) Information on the reverse side of both pages of the pay voucher--

C. OFFICERS' EXPENSE VOUCHER

D. PERSONAL REPORT--OFFICERS.

1. Definition--

2. Copies and Disposition--

3. Regulations for the use of the form--

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MILITARY SUBJECTS DEPARTMENT

ARMY PAPER WORK AND SQUADRON ADMINISTRATION
(STUDENT'S NOTES)

THE ORGANIZATION OF A MILITARY OFFICE AND ROUTINE FORMS USED IN ADMINISTRATION

A. ORGANIZATION OF A COMPANY OFFICE

1. Called an Orderly Room

2. Duties of the Commanding Officer, the First Sergeant, Supply Sergeant and clerks with regard to Paper Work -

   a. The Company Commander -

   b. The First Sergeant -

   c. The Supply Sergeant -

   d. The Company Clerk -

B. ORGANIZATION OF A POST HEADQUARTERS

1. Adjutant's duties with regard to Paper Work.

   a. Relations with commanding officer -

   b. Responsibility with regard to correspondence records and reports

   c. Disposition of correspondence -

2. Position of the Adjutant in the command.

   a. Performance of duty -

b. Authority of Adjutant

c. An example to the command -

3. Duties of the Sergeant Major with regard to Paper Work.

a. General knowledge -

b. His responsibility -

c. Special knowledge -

4. Duties of Clerks and Ordlies.

ROUTINE FORMS USED IN ADMINISTRATION

C. MORNING REPORT

1. References -

2. Definition -

3. Period covered by the form, copies and disposition.

a.

b.

4. Manner of using the form.

a. Collection of data -

b. Completion of the form -

c. Forwarding to Post Headquarters and Consolidation -

5. Information and instructions to complete the form.

a. Completion of data under personnel of the command -

b. Extra duty, special duty, detached service, etc. -

c. Remarks -

d. Rations -

e. Station and Record of Events -

f. Computation of corrections for ration returns -

D. RATION RETURN

1. References -

2. Definition -

3. Manner of using the form.

3. Instructions to completethe form.

a. "Ration return of" -

b. "At" -

c. "From" and "To" -

d. "Number of days" -

e. "Persons present " -

f. "Number of rations" -

g. "Additions" -

h. "Deductions" -

i. "Net corrections" -

j. "Number emergency rations required" -

k. Number of rations required -

l. "Other issues required" -

m. Rations only for those present -

4. Copies and disposition.

a. Original, with certified statements -

b. Duplicate, without the certified statement -

5. Types of rations and their use.

a. Garrison -

b. Travel -

c. Reserve -

d. Field -

e. Filipine -

f. Emergency -

F. DUTY ROSTER

1. References -

2. Definition -

3. Period covered by the form, copies and disposition.

a.

b.

c.

4. Manner of using the form.

5. Definition of terms used.

a. A tour of guard -

b. Relief -

c. Kitchen police -

d. Fatigue duty -

e. Charge of quarters and room orderly -

6. Instructions to complete the form.

a. Transfer of names -

b. Detailed instructions for useof the Guard Roster -

(1) "Present and available" -

(a)

(b)

(c)

(2) Available but not required for guard duty -

c. Abbreviations to be used in the Guard Roster -

Abbreviations should be strictly adhered to.

A. -	Absent without leave.
Ar.	Arrest in quarters.
C.	In confinement.
D.S.	On detached service.
E.D.	On extra duty
F.	On furlough
P.	On pass
Rct.	Recruit
S.D.	On special duty.
Sk.	Sick.

d. Detailed instructions for roster for other duties -

(1) Transferring record from pevious month -

(2) Recording a duty performed -

(3) Duties not specified on roster -

(4) Details for detached service -

G. DAILY SICK REPORT

1. References -

2. Definition -

3. Manner of using the form.

4. Instructions.

a. Signature of a company commander and medical officer -

b. Line of duty -

c. Changes and erasures -

d. Continued illness -

e. General instructions -

5. Copies and disposition, and period covered by the form.

a.

b.

c.

H. GUARD REPORTS

1. References -

2. Definition -

3. Copies and disposition and period covered by the form.

a.

b.

c.

4. Manner of using the form.

a.

b.

c.

5. Instructions to complete the form.

a. Entering the names of prisoners -

b. Transferring list from previous month -

c. Transferring names at end of month -

d. Entering names of prisoners confined during the month -

e. Numbering of prisoners -

f. Data for Remarks on Prisoners -

g. Data for Ermarks on the Guard -

h. Extra sheets for the form -

I. SQUADRON (COMPANY) FUND - (COUNCIL BOOK)

1. References -

2. Definition -

3. Sources of the fund.

4. Regulations concerning the squadron fund.

a. Custodian of the fund -

b. Checks on the fund -

c. Disbursement of funds -

d. Recorder of the Council -

e. Division of the fund -

f. Inspection of the fund and accounts -

5. Regulations for the usecf the Council Book.

a. Vouchers -

6. Transfer of Council Fund -

a. Receipts -

b. Notification of bank -

c. Certified statement of the officer transferring the fund -

7. Use of the Council Book -

a. Expenditures-

b. Monthly Account -

c. The certified statements -

8. Carelessness in accounting for fund - Misappropriation.

J. PAY ROLL AND PAY CARDS

Note:

1. Definition -

2. Copies and disposition.

3. Miscallaneous Items.

4. Manner of using the form.

5. Instructions to complete the form.

K. SQUADRON (COMPANY) RETURN

1. References -

2. Definition -

3. Copies and disposition.

   a.

   b.

4. Regulations for the use of the form.

   a. When rendered -

   b. Responsibility for accuracy of the return -

   c. Account of enlisted men and officers -

   d. Data to be given under Remarks opposite officer's name -

5. Instructions to complete the form.

   a. Condition of the organization at midnight on the last day of the month -

   b. Number of men to be discharged during the next three months and the number who will probably re-enlist -

   c. Effective strength -

   d. Alterations since the last monthly return -

e. Signatureof the commanding officer -

f. Officers present and absent accounted for by name -

g. Under Remarks -

h. Record of events -

5. Common errors noted in the Squadron Return.

L. FIELD RETURN

1. Definition -

2. Copies and disposition.

a.

b.

c.

3. When the form is used.

a.

b.

c.

4. Instructions to complete the form.

5. Important points of differencebetween this form and the Squadron Return -

a.

b.

c.

d.

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MILITARY SUBJECTS DEPARTMENT

ARMY PAPER WORK AND SQUADRON ADMINISTRATION
(STUDENT'S NOTES)

PUBLIC PROPERTY - SURVEY OF PUBLIC PROPERTY - INSPECTION OF PUBLIC PROPERTY

A. ACCOUNTABILITY

1. Definition

B. RESPONSIBILITY

1. Definition

C. RESPONSIBILITY OF POST COMMANDER FOR PUBLIC PROPERTY

1. Security of Public Property

D. RESPONSIBILITY OF COMMANDER OF SMALLER UNITS

1. Transfer of hisresponsibility
2. Superintends issued
3. Temporary responsibility
4. Detail for detached service

E. TRANSFER OF PUBLIC PROPERTY

1. Points in the trasfer of Public Property

2. Forms used

F. COMBINATION BLANK, INVOICE OR RECEIPT FOR TRANSFER OF PUBLIC PROPERTY

1. Definition

2. Regulations for the use of the form

3. Instructions to complete the form

G. GENERAL REGULATIONS FOR OFFICERS INVOLVED IN TRANSFER OF PUBLIC PROPERTY

1. Proper receipt for public property

2. Checking and examining property

3. Checking sealed packages

H. CARE OF PUBLIC PROPERTY

1. Keys for the storeroom

2. Repair of property

3. Marking of property

I. DISPOSITION OF UNSERVICEABLE PUBLIC PROPERTY

1.

2. Classifications of unserviceable public property

(1) Property worn out: (not saleable)

(2) Property worn out: (some saleable)

(3) Property rendered unserviceable

3. Disposition of above classes -

a. Class (1)

b. Class (2)

c. Class (3)

J. SURVEYS OF PROPERTY

1. Appointing authority of Surveying officer. Eligibility.

a.

b.

c.

2. Duties of the surveying officer

a.

b.

c.

d.

e.

3. Duties of persons responsible for public property who desire the same to be approved.

a.

b.

4. Authority of the surveying officer.

a.

b.

c.

d.

e.

f.

K. REPORT OF SURVEY

1. Definition

2. Copies and disposition of the form

a.

b.

c.

3. Manner of using the form.

a.

b.

c.

d.

e.

f.

g.

h.

i.

j.

k.

4. Action taken when Report of Survey recommends stoppage against enlisted man.

a.

K. INSPECTION OF PUBLIC PROPERTY

1. Appointing authorities of inspectors.

a.

2. Authority of the inspector.

a.

b.

3. Manner of conducting inspection.

a.

b.

c.

d.

e.
d

4. Instructions for inspectors.

a.

b. Terms to be used in his recommendation for disposition:

c. Worthless articles ordered destroyed

d. Articles which cannot be destroyed

5. Use of the Q.M.C. Reclamation Division -

L. INVENTORY AND INSPECTION REPORT

1. Definition

2. Copies and disposition of each

a.

3. Regulations for the use of the form

a.

b.

c.

4. Instructions to complete the form

a. Column I -

b. Column 2 -

c. Column 3 -

d. Column 4 -

e. Column 5 -

f. Column 6 -

g. First Indorsement-

h. Second Indorsement -

i. Columns 7 - 12 -

j. Column 11a-

k. Column 12 -

l. Recommendation for destruction -

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MILITARY SUBJECTS DEPARTMENT

ARMY PAPER WORK AND SQUADROM ADMINISTRATION
(STUDENT'S NOTES)

DISBURSING OF PUBLIC FUNDS - MONEY ACCOUNTABILITY - EQUIPMENT

A. DISBURSING OF FUNDS--MONEY ACCOUNTABILITY

1. Requirements of an officer handling public funds

   a.

   b.

2. Regulations for disbursing officer.

   a.

   b.

   c.

   d.

   e.

   f.

g.

h.

3. System of disbursing appropriations of Congress.

a.

b.

c.

d.

e.

f.

4.

a.

b.

c. The disbursing officer's account

d. An account current defined

e. The authority for an expenditure

B. EQUIPMENT

1. Classes of equipment

2. Grouping of equipment

a.

b.

c. Groups defined

3. Accountability for equipment

a.

b.

c.

4. Regulations for the account of the Unit Supply Officer

a.

b.

c.

d.

e.

5. Duties of the examining officer.

a.

b.

c.

d.

I certify that all transactions in this Return of _____ property, sheets numbered 1 to ____, inclusive, for the period from _____191___ to_____, 191_____, as shown by vouchers numbered _____ to _____ hasbeen examined by me and that I found all balances brought forward, all property on debit vouchers taken up and all property dropped covered by authorized credit vouchers which comply with regulations.

_____

_____U.S.Army.

(Date)_____,191____.

6. PROPERTY RETURN.

a. Definition.

b. Copies and disposition of these forms

c. Use of the form

d. Certified statements to be used at the end of the accounting period by the officer submitting the Return:

e. Certificate to be signed by the accountable officer when turning over his accountability to a successor:

f. Certificateto be completed by the officer to whom the accountability has been transferred:

7. Vouchersto the Property Return - Introduction

a.

8. MEMORANDUM RECEIPTS

a. Definition

b. Copies and disposition

9. REQUISITION

a. Definition

b. Expendable articles -

c. Use of the form

10. Other forms that may be used as vouchers to the return of the Unit Supply Officer which cannot be discussed in detail for lack of time.

a.

b.

11. Manner of replenishing equipment by the commanding officer of a sub-organization.

a.

b.

c.

d.

e.

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MILITARY SUBJECTS DEPARTMENT

RANK, GRADE, UNIFORM, AND INSIGNIA - SUTDENT'S NOTES

I. RANK AND GRADE OF OFFICERS AND NON-COMMISSIONED OFFICERS

A. RANK

1. Definition - Military rank is that character or quality bestowed on military persons which marks their station and confers eligibility to exercise command or authority in the military service, within the limits prescribed by law.

2. Nature -

B. GRADE

1. Definition - That degree of rank which marks the relative positions and powers of the different classes holding it.

2. The different commissioned grades of the army with the appropriate command for each and the corresponding naval grades are as follows:

GRADE	COMMAND	CORRESPONDING NAVAL OFFICER
	OFFICERS	
1. General	Army	Admiral
2. Lieut. General	Army Corps	Vice Admiral
3. Maj. General	Division	Rear Admiral
4. Brig. General	Brigade	Rear Admiral(Junior)
5. Colonel	Regiment	Captain
6. Lieut. Colonel	(Regiment)	Commander
7. Major	Battalion	Lieut. Commander
8. Captain	Company	Lieutenant
9. First Lieutenant		Lieut. Junior Grade
10. Second Lieutenant		Ensign
	INTERMEDIATE GRADES	
1. Aviator, Signal Corps		
2. Cadet		Midshipman

3. The different grades of Army non-commissioned officers, in general, are as follows: (for details see Art. III, A.R.)

1. Sergeants-major, sergeants senior grade, etc.
2. First sergeants, sergeants first class, etc.
3. Color Sergeant
4. Sergeant
5. Corporal

HOW PRECEDENCE IS DETERMINED AMONG OFFICERS OF THE SAME GRADE

1.

2.

II. UNIFORMS AND INSIGNIA (FOR SERVICE IN THE U.S.)

A. UNITED STATES ARMY

1. Coat and Breeches -

2. Caps -

3. Hats -

Officers-

Enlisted men-

4. Hat cords -

(a) Officers - (1) General Officers -

(2) All others -

(b) Enlisted men - According to the Corps to which they belong as follows:

Quartermaster Corps----------Buff
Corps of Engineers----------Scarlet & White
Ordnance Dept.----------Black & Scarlet
Signal Corps ----------Orange & White
Infantry----------Blue
Cavalry----------Yellow
Artillery----------Scarlet
Medical Corps----------Maroon & White
U.S.T.C.----------Red, White & Blue
Detachments at Army Service Schools-Green

(c) Army Field Clerks -

5. Overcoats - (Olive drab)

(a) Officers -

(b) Enlisted men -

6. Leggins -

(a) Officers -

(b) Enlisted men -

7. Shoes -

8. Gloves -

9. Collar ornaments -

(a) Officers -

(b) Enlisted men -

(c) When shirt without coat is worn by officers -

10. Chevrons and Specialty Marks for Enlisted Men -

11. Flying Cadets -

(a)

12. Recommended for commission -

(a)

13. Identification tags -

(a) Officers -

(b) Enlisted men -

14. Aviation uniform -

(a)

15. Athletic Clothing -

(a)

16. Civilian Clothing -

17. Decorations -

(a) Distinguished Service Medal -

(b) Distinguished Service Cross -

(c) War Service Chevrons -

(d) Wound Chevrons -

(e) Medals and Badges -

18. Jewelry and Foreign Decorations -

19. Civilians who may wear the olive drab uniform.

(a)

(b)

(c)

(d)

(e)

B. UNITED STATES NAVY

1. Coat and Trousers -

2. Caps and hats -

(a) Enlisted men -

(b) Officers -

3. Overcoats -

(a) Enlisted men -

(b) Officers -

4. Leggins -

5. Shoes -

6. Insignia -

B. MARINE CORPS

1. Coat and Breeches -

2. Hats and Caps -

3. Hat Cords -

4. Overcoats -

5. Leggins -

6. Shoes -

7. Insignia -

B. BRITISH ARMY

1. Coat and Breeches -

2. Caps -

3. Leggins -

4. Shoes -

5. Insignia - For officers worn on the sleeve as follows:

Field Marshal - Crossed batons with laurel wreath and crown above.
General - crossed sword and baton, and crown and star.
Lieut. General - crossed sword and baton and crown.
Major General - crossed sword and baton and star.
Brigadier General - crossed swords.
Colonel - four stripes or rings and a crown and two stars.
Lieut. Colonel - three stripes or rings, a crown and a star.
Major - three stripes or rings, and a crown.
Captain - two stripes or rings, and three stars.
Lieutenant - One stripe and two stars.
Second Lieutenant - one stripe or ring and one star.

For non-commissioned officers:
Chevrons point downwards on the upper right arm (a lance corporal or acting bombardier 1; corporal 2; sergeant 3; color sergeant 3, and crossed colors; staff sergeant 4).

A sergeant major is dressed as an officer except that he has a crown on the lower part of the right elbow.

The Sam Browne bolt is habitually worn by officers except in quarters or at mess.

The corps, departmental and regimental badges are worn on the lapels of the coat..

6. Decorations -

(a) Qualified pilot, Royal Flying Corps -

(b) Wound stripes -

(c) Victoria Cross -

(d) The Military Cross -

(e) Distinguished service Order -

E. BRITISH NAVY

1.

F. FRENCH ARMY

1. Coat and Breeches -

2. Caps -

3. Leggins -

4. Insignia - The number of regiment is shown on the collar. For officers the following insignia is worn on the lower part of the sleeve:

Marechal of France	6 small gold stars
General de Division (General Lieutenant)	3 small gold stars
General de Brigade (General Major)	2 small gold stars
Colonel	5 gold bars
Lieutenant Colonel	3 gold bars and 2 silver bars
Major	4 gold bars
Captain	3 gold bars
Lieutenant	2 gold bars
Sous Lieutenant	1 gold bar
Adjutant (W.O.)	1 silver bar, red striped
Sergeant Major	2 broad gold bars
Sergeant	1 broad gold bar
Corporal	2 dark blue woolen bars
Soldat 1 Cl	1 dark blue woolen bar
Bugler	Red, white and blue bar.

5. Decorations -

(a) Wound chevrons -

(b) Service chevrons -

(c) The cross of the Legion of Honor -

(d) The Military Cross -

(e) The War Cross -

G. FRENCH NAVY

1.

H. GERMAN ARMY AND NAVY

1. Army uniform -

2. Navy uniform -

I. ITALIAN ARMY AND NAVY

1. Army uniform -

2. Navy uniform -

J. AUSTRIAN ARMY AND NAVY

1.

K. RUSSIAN ARMY AND NAVY

1. Army uniform -

2. Navy uniform -

L. BELGIAN ARMY

1.

M. TURKISH ARMY AND NAVY

1.

N. SERBIAN ARMY

1.

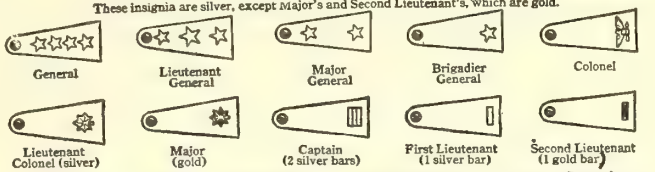
UNITED STATES ARMY

Plate 1

OFFICERS' INSIGNIA

Insignia of Grade on Shoulder Loop of Service Uniform.

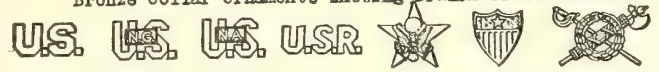
These insignia are silver, except Major's and Second Lieutenant's, which are gold.



General | Lieutenant General | Major General | Brigadier General | Colonel

Lieutenant Colonel (silver) | Major (gold) | Captain (2 silver bars) | First Lieutenant (1 silver bar) | Second Lieutenant (1 gold bar)

Bronze Collar Ornaments showing Branch of the Service.



Regular Army | National Guard Army | National Army | U. S. Reserve | General Staff | Adjutant General's Dept. | Inspector General's Dept.



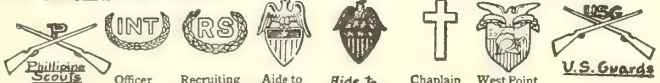
Judge Advocate's Dept. | Signal Corps (including Aviators) | Engineer Corps | Field Artillery | Coast Artillery Corps | Cavalry



Infantry | Machine Gun Battalion | Ordnance Dept. | Quarter Master Corps | Medical Dept. | Ambulance Corps, Med. D. | Nurses' Corps, Med. D. | Dental Corps, Med. D. | Sanitary Corps, Med. D. | Veterinary Corps, Med. D.

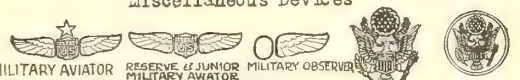


Officer's Collar Arrangement



Officer Interpreter | Recruiting Service | Aide to Brig. Gen. | Aide to Lt. Gen. | Chaplain | West Point U. S. M. A.

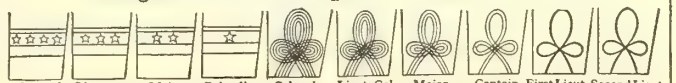
Miscellaneous Devices



AVIATION INSIGNIA-worn on left breast ...
(For "Mil. Aeronaut," etc., substitute balloon for shield between wings.

Officer's Cap Device | U. S. Army Button

Insignia of Grade on Sleeve of Service Overcoat



General | Lieutenant General | Major General | Brigadier General | Colonel (5 braids) | Lieut. Col. (4 braids) | Major (3 braids) | Captain (3 braids) | First Lieut. (1 braid) | Second Lieut. (1 brown braid)

UNITED STATES ARMY

Plate 2

ENLISTED MEN'S INSIGNIA

Sleeve Insignia- Noncommissioned grades, Specialty Marks, etc.



Regimental Sergeant-Major | Regimental Supply-Sergeant | Battalion Sergeant-Major | Color Sergeant | First Sergeant | Band Leader | Assistant Band Leader | Sergeant Drum Major | Sergeant | Corporal



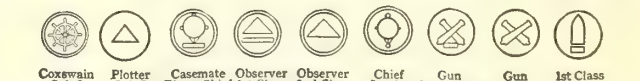
Sergeant Bugler | Master Hospital Sergt. Med. D. | Hospital Sergeant Med. D. | Sergeant 1st Class Med. D | Sergeant Med. D. | Corporal Med. D. | Master Senior Grade Eng. C. | Eng. Master Junior Grade Eng. C. | Sergeant 1s. Class Eng. C. | Battalion Supply Sergt. Eng. C.



Master Signal Electrician | Sergeant 1st Class S. C. | Sergeant S. C. | Corporal S. C. | Ordnance Sergeant | Sergeant 1st Class Ord. D. | Corporal of Ordnance | Q. M. Sergeant Sr. Grade | Q. M. Sergeant Q. M. C. | Sergeant 1st Class Q. M. C.



Sergeant Q.M.C. | Corporal Q.M.C. | Chief Mechanic F. A. | Engineer C.A.C. | Asst. Engineer C.A.C. | Fireman C.A.C. | Master Gunner C.A.C. | Master Electrician C.A.C. | Elec. Sergt. 1st Class C.A.C. | Elec. Sergt. 2nd Class C.A.C. | Radio Sergeant C.A.C.



Coxswain C.A.C. | Plotter C.A.C. | Casemate Elect., Planter, C.A.C. | Chief 1st Class C.A.C. | Observer 2nd Class C.A.C. | Chief Loader C.A.C. | Gun Commander C. A. C. | Gun Pointer C.A.C. | 1st Class Gunner C.A.C. F.A.



2nd Class Gunner C. A. C., F.A. | 1st Class Gunner Mine Co. C.A.C. | 2nd Class Gunner Mine Co C.A.C. | Target Excellence C.A.C. | Farrier Med. D. | Saddler | Wagoner | Horseshoer | Military Police (arm band)



Mechanic | Cook | 1st Class Private Inf. | U. S. Training Camp | Res. Off. Training Corps | Bugler | Stable Sergt. | Mess Sergt. | Batt. Supply Sergt. | Co. Supply Sergt.

(Last five chevrons are discontinued but still worn)

There are First Class Private service chevrons in Inf., Cav., F. A., C. A. C., S. C., Eng. C., Q. M. C., Ord. D., Med. D.

Aviation Insignia -worn on right sleeve at shoulder



Aviation Mechanician | Enlisted Aviator | Enlisted Men

UNITED STATES ARMY

ENLISTED MEN'S INSIGNIA

Plate 3

Bronze Collar Ornaments showing Branch of the Service



U. S. Regular Army | U. S. Regulars, regimental number | National Guard Army | National Army | Collar Arrangement U. S. regiment, right; Service company, left | U. S. Reserve | U. S. Volunteers



Coast Artillery Co. | Engineers, Co. letter | Signal Corps | Quarter Master Corps | Ordnance Dept. | Medical Dept. | Machine Gun Battalion | Anti-Aircraft | Trench Mortar



Electrician | Bandsman | Infantry, company letter | Cavalry, company letter | Field Artillery, and C. A. C. | Head-quarters Co., etc. | Div. Amm. & Supply Trains | Intelligence Police | Recruiting Service

UNITED STATES MARINE CORPS

MISCELLANEOUS INSIGNIA - OFFICERS & ENLISTED MEN

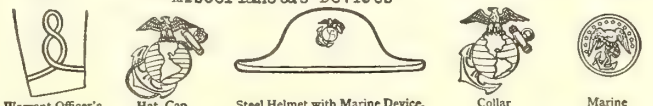
Devices of the Marines are generally similar to Army; most of those differing are shown here. Marine chevrons are red on winter field forester green uniform. Summer field uniform is lighter khaki than Army. Marines wear Corps device on service hat, cap and steel helmet. Officers wear hat cord of gold striped with red; men, no cord. Men's summer field coats have top pockets only; men wear trousers, with leggings added fo active service; officers wear breeches. Overcoats have shoulder loops and loop insignia. Major General is highest ranking officer.

Insignia of Grade on Sleeve of Overcoat

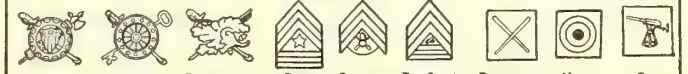


Major General | Brigadier General | Colonel | Lieutenant Colonel | Major | Captain | First Lieutenant | Second Lieutenant

Miscellaneous Devices



Warrant Officer's Overcoat Sleeve Mark | Hat, Cap and Helmet Device | Steel Helmet with Marine Device, worn by U. S Marines on French Battlefront | Collar Device | Marine Button



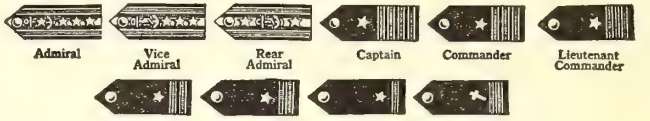
Adjutant and Inspector Dept. | Quarter-master Dept. | Paymaster Dept. | Drum Major Chevron | Gunnery Sergeant Chevron | Pay Sergt. Chevron | Drummer Chevron | Navy Expert Chevron | Gun Pointer Chevron

UNITED STATES NAVY

OFFICERS' INSIGNIA

Plate 4

Insignia of Grade on Shoulder of Overcoat & Summer Coat
Gold Markings

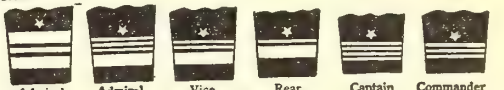


Admiral | Vice Admiral | Rear Admiral | Captain | Commander | Lieutenant Commander

Lieutenant | Lieutenant, Junior Grade | Ensign | Chaplain

Insignia of Grade on Sleeve of Blue Service Coat
Gold Markings

Following branches wear colors between gold braid on shoulder marks and sleeves: Medical, maroon; Pay C., white; Prof. Mathematics, green; Naval Constructor, violet; Civil Engineer, blue; Dental C., orange. Chaplains wear black braid.

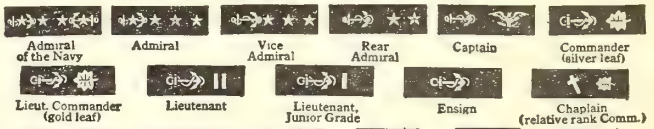


Admiral of the Navy | Admiral | Vice Admiral | Rear Admiral | Captain | Commander



Lieut. Commander (2 broad, 1 narrow stripe) | Lieutenant | Lieut., Junior (1 broad, 1 narrow stripe) | Ensign

Insignia of Grade on Collar of Blue Service Coat
Silver Markings, except as noted



Admiral of the Navy | Admiral | Vice Admiral | Rear Admiral | Captain | Commander (silver leaf)

Lieut. Commander (gold leaf) | Lieutenant | Lieutenant, Junior Grade | Ensign | Chaplain (relative rank Comm.)

Medical Director (Captain's rank) | Pay Director (Captain's rank) | Prof. Mathematics (Commander's rank) | Naval Constructor | Civil Engineer | Dental Corps, (relative rank of Lieut.)

Miscellaneous Devices



Naval Officer's Button | Commissioned Officer's Cap Device | Aviator Officer's Gold Breast Mark

UNITED STATES NAVY

WARRANT OFFICERS' INSIGNIA

Plate 5

Insignia of Grade on Shoulder of Overcoat & Summer Coat
Gold Markings

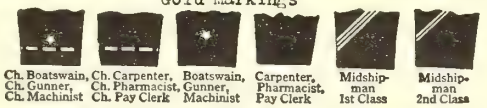


Chief Machinist | Chief Carpenter | Chief Pharmacist | Chief Pay Clerk

Chief Boatswain | Chief Gunner | Warrant Gunner | Warrant Carpenter

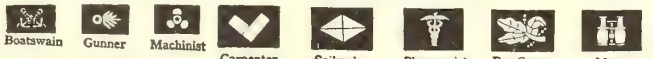
Warrant Officers' marks are same as Chief Warrant Officers, but without stripe, as Warrant Gunner shown here.

Insignia of Grade on Sleeve of Blue Service Coat
Gold Markings



Ch. Boatswain, Ch. Gunner, Ch. Machinist | Ch. Carpenter, Ch. Pharmacist, Ch. Pay Clerk | Boatswain, Gunner, Machinist | Carpenter, Pharmacist, Pay Clerk | Midshipman 1st Class | Midshipman 2nd Class

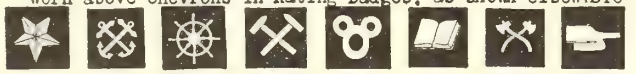
Insignia on Collar of Blue Service Coat



Boatswain | Gunner | Machinist | Carpenter | Sailmaker | Pharmacist | Pay Corps (No Mates on active list) | Mates

PETTY OFFICERS' INSIGNIA

Distinguishing Sleeve Marks
Worn above chevrons in Rating Badges, as shown elsewhere



Master at Arms | Boatswain's Mate | Quartermaster | Blacksmith, Ship Fitter | Sailmaker's Mate | Printer | Carpenter's Mate | Turret Captain



Gunner's Mate | Storekeeper | Yeoman | Electrician | Machinist, Etc. | Hospital Corps (red) | Musician | Commissary Steward

MISCELLANEOUS INSIGNIA



Warrant Officer's Cap Device | Chief Petty Officer | Ch. Petty Officer Coast Guard | Enlisted Men's Button | Naval Reserve Button | Midshipman

UNITED STATES NAVY

Plate 6

RATING BADGES AND DISTINGUISHING SLEEVE MARKS

Rating Badges on blue uniform have white eagle and marks (except Hospital C., red) with red cloth chevron bars. Petty officers, receiving three consecutive good conduct medals, wear gold chevrons. On white uniform, Rating Badge is entirely blue (except Hospital Corps red mark).



Chief Quartermaster Naval Flying Corps | Machinist's Mate, Naval Flying Corps | Carpenter's Mate, Naval Flying Corps | Chief Master at Arms | Boatswain's Mate 1st Class | Gunner's Mate 2nd Class | Quartermaster 3rd Class | Torpedo Man | Ex-Apprentice



Expert Rifleman | Ship's Cooks, Bakers | Bugler | Seaman Gunner | Gun Captain | Gun Pointer 1st Class | Gun Pointer 2d Class | Excellence (Merit Mark) | Radio Operator

MISCELLANEOUS NOTES ON INSIGNIA

NAVAL RESERVE.—The Naval Reserve units are distinguished in the U. S. Navy by a distinctive button and an individual collar device, same as Commissioned Officer's cap device instead of the anchor markings of the regular Naval service. Note the Naval Reserve Lieutenant's marking here shown. Lieutenant-Commander is (Dec. 1917) the highest ranking officer of Naval Reserve.





NAVAL MILITIA, ETC.—The distinguishing marks are for officers, a circle around a star, and for enlisted men an anchor in a diamond. Commodore is the highest ranking officer in the Naval Militias of the States. The Coast Guard has marks of its own, chief of which is the eagle with head turned to its right, instead of left, as in Navy; U. S. Shield (as shown above), etc. U. S. Public Health Service has its own marks.



SERVICE STRIPES.—On blue dress uniform of the Army, on blue and field uniforms of the Marines and on the blue service and dress uniforms of the Navy, service stripes are worn by enlisted men on the lower left sleeve. Each stripe represents four year's service in the Navy and Marines and three years' service in the Army. Enlistment now is for the period of the war in the Army and Marine Corps.

NAVY SHOULDER STRIPES.—Non-rated enlisted men wear braid around shoulder. A man of the Deck Force wears white braid on the right shoulder seam. A man of the Engineer Force wears red braid on the left shoulder seam. Petty Officers of the Deck Force wear rating badges on right sleeves. Petty Officers of the Engineer Force and special branches wear rating badges on their left sleeves. Shoulder seam stripes were formerly Watch Marks.

NAVY CUFF STRIPES.—Three white stripes on sailor's blouse cuff indicate a seaman, first class; two stripes indicate a seaman, second class; one stripe, apprentice seaman. Firemen and Messmen (officer's mess attendants, etc.) have same 1st, 2nd and 3d class wrist stripes, but wear no shoulder seam marks.

NAVAL AVIATORS wear a summer khaki uniform similar to the Marines; also Naval cap and shoulder straps with naval ranking marks, aviation insignia above left coat pocket top, and cloth spiral leg puttees. Forester green is the winter service wear of the Naval Flying Corps. Marine aviators wear regulation Marine uniforms.

5/14/18.

UNITED STATES
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY

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MILITARY SUBJECTS DEPARTMENT

\- - -

STUDENT'S NOTES ON ARMY REGULATIONS

\- - -

Principal references U.S. Army Regulations, corrected to April, 1917, with corrections sheets to date.

Unless otherwise noted, all organizations to which reference is made are those of the Infantry, and of the Regular Army.

\- - - - - - -

THE ENLISTED MAN

1. ENLISTMENT

a. Qualifications

1. Age

a. The Regular Army

(1) For the period of the emergency

(2) For time of peace

(3) Under 18 years of age

(4) Under 16 years of age

b. The National Guard

(1) For time of peace

(2) War time

c. The National Army

d. The Enlisted Reserve Corps

e. The Regular Army Reserve

2. Citizenship

3. Physical, mental and moral fitness

a.

b.

c.

4. Enlistment of married men

a. Peace time

b. War time

5. Special qualifications

a. General

b. The Enlisted Reserve Corps

c. The Regular Army Reserve-time of peace

(1)

(2)

(3)

B. Period of Enlistment

1. The Regular Army

a. Peace time

(1) Usual system

(2) One year--six year system

b. War time

(1)

(2)

2. The National Guard

a. Peace time

b. War time

3. The National Army

4. The Enlisted Reserve Corps

a. Peace time

b. War time

5. The Regular Army Reserve

C. Routine of Enlistment

1. Physical examination

2. The Articles of War

3. The Oath of Enlistment

4. The Service Record

5. Assignment for training

6. Allotments and Insurance

a. Compulsory allotment

b. Voluntary allotment

c. War risk Insurance

II. PAY OF ENLISTED MEN

A. Method

1.

2.

3.

4.

5.

B. Additional Pay

1. Extra Duty Pay

a. Definition of Extra Duty and pay for the same.

b. Present Status

2. Pay for Foreign Service

3. Additional Pay for Various Ratings

4. Additional Pay for Re-enlistment

a. General note

b. Pay of over $36 per month

c. Pay between $18 and $36 per month

d. Less than $18 per month

III. FURLOUGH

A. Definition

B. Rules for the issuing of Furloughs

1.

2.

3.

4.

5.

6.

7.

C. Authorities who may issue Furloughs

1. For one month

2. For three months

3. Over three months

a. By the Adjutant General

b. By the Philippine Department Commander

IV. PROMOTION OF ENLISTED MEN

A. Recommended by -

B. Appointed by -

1.

2.

C. The Warrant

1. Definition

2. Issued to -

3. Ratings not accompanied by Special Warrants

D. Transfer of noncommissioned officers which affect the warrant

E. Reduction of noncommissioned officers

1.

2.

V. TRANSFER OF ENLISTED MEN

A. Reasons for which made

a.

b.

c.

B. Authority for transfer - commanders of:

1.
2.
3.
4.
5.
and also:
6.
7.

VI. TRAVEL ON DUTY FOR ENLISTED MEN

A. Order authorizing travel

1.

2.

B. Procedure

C. Rules governing Pullman Accommodation

1.

2.

3.

D. Foreign travel

E. Baggage regulations

1. Free or excess baggage

2. For European baggage

3. Container

F. Rations while travelling

1. Journey of 12 to 24 hours

2. Travel lasting from 24 to 72 hours

3. Journeys of over 72 hours

VII. DISCHARGE OF ENLISTED MEN

A. Reasons

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

B. Types

1. Honorable discharge

2. Dishonorable discharge

3. Discharge

C. Disposition of Service Record when soldier is discharged

D. Final Statement

E. Transportation

1.

2.

III. DERSERTION

A. Definition

B. Action taken by company or detachment commander upon desertion

1.

2.

3.

C. Action taken by Commanding Officer

1. Publication of descriptive list

2. Notification of the A.G.O.

3. Reward

D. Procedure when deserter is arrested

1. Notification of-

2. Procedure relative to a National Army deserter

3. Report of capture

E. Disposition of captured or returned deserter

1. If deserter claims exemption under Statute of Limitations (A.W.30)

a. Affidavit

b. Release

2. When deserter is unfit for service:

a. Discharge if desertion is admitted

b. If discharge is not admitted

3. When deserter is fit for service:

a. Trial

b. Restoration to duty

F. Forfeitures

1. When restored to duty

a. Pay

b. Lengthening of enlistment period

c. Charged with reward

d. Rights with regard to pay and allowance

2. When charges are removed

a. Erroneous charges

b. Removal of stoppages and forfeitures

3. When sentenced

a. Forfeitures

IX. RETIREMENT OF ENLISTED MEN

A. Definition

B. Status of retired enlisted men

C. Reasons for retirement

1. Length of service

2. Foreign service

D. Procedure of retirement

1. War Department order

2. Final Statement, etc.

3. Discharge certificate

4. Notification of Quartermaster

5. Report of address

E. Pay and allowances

1. Pay

2. Commutation of clothing and rations

3. Commutation of quarter, fuel and light

X. DEATH OF ENLISTED MEN

A. Duties of immediate commanding officer

1. Disposition of effects

2. Notification of relatives

B. Reports required by the War Department

1. Report of death and disposal of remains

2. Report of surgeon

a.

b.

c.

3. Final statement

4. Report of Board of Officers

5. Inventory of effects

C. Disposition of effects

1. Delivered to-

2. If not claimed-

3. Personal property

D. Settlement of estate

1. If relatives cannot be located

2. Payment of debts

3. Allotments, compensations and insurance

4. Funeral Expense

5. Shipment of remains

E. The effects of enemy dead

1. Disposition

THE COMMISSIONED OFFICER

I. APPOINTMENT OF COMMISSIONED OFFICERS

A. Qualifications for Original Appointment

1. Age
    a. For Commission in Regular Army
    b. Officers' Reserve Corps
2. Citizenship
3. Physical, Mental and Moral Fitness
4. Appointment of married men
    a. Regular Army
    b. All other branches

B. Period of Commission

1. Regular Army
    a. Permanent Commissions
    b. Provisional Commissions
    c. Temporary Commissions
2. National Guard
3. National Army
4. Officers' Reserve Corps

C. Grades in which original commissions are granted

1. Regular Army
2. National Guard and National Army - all grades
3. Officers' Reserve Corps

D. Procedure

1. Application for Commission

2. Notice of Appointment

3. Acceptance

4. Call to active duty

5. Report for duty

6. Miscellaneous duties

II. PAY OF OFFICERS

A. Base Pay

B. Longevity Pay

C. Additional Pay

1. For foreign service

2. For the various ratings in the Aviation Section, Signal Corps

3. For other types of service when specified.

D. Method of Payment - The Pay Voucher

III. ALLOWANCES TO OFFICERS

A. Quarters

1. When in the Field or outside the territory of the U.S.

2. When not in the field

3. Quarters allowed

B. Light and Heat

C. Stationery

D. Mounted Officers

E. Clothing and Equipment

IV. LEAVE OF ABSENCE

A. Definition

B. Customs with regard to Leaves of Absence

C. Regulations governing Leaves of Absence

D. Applications for Leave

E. Authorities who may grant leaves

F. Leaves to go hunting

G. Procedure to be followed - leave of over 10 days

1. At departure

2. On returning

V. PROMOTION OF OFFICERS

A. Officers below the grade of general officer.

1. Regular Army

2. National Guard, National Army and Officers' Reserve Corps

3. American Expeditionary Forces

B. General Officers

VI. TRANSFER OF OFFICERS

A. For the good of the service

B. Upon request

VII. TRAVEL ON DUTY FOR OFFICERS

A. Travel with troops

B. Travel as individual (under orders)

1. Orders

2. Report

3. Mileage voucher-allowance

C. Travel to Europe

D. Baggage to Europe

VIII. SICK REPORT

A. Same as for enlisted men

B. Sick leave

IX. RESIGNATION OR DISCHARGE

A. Rules governing resignation

1. In time of peace

2. In time of war

3. Under charges

4. Acceptance of Resignation

B. Rules governing discharge

1. By General Court Martial

2. Recommendation of Discharge Board

3. For good of the Service - by the President

X. RETIREMENT OF OFFICERS (PERMANENT OFFICERS OF REGULAR ARMY ONLY)

A. Reasons for retirement

1. Automatically at the age of 64

2. By the President

3. At his own request

4. For the good of the service

5. By special Act of Congress

B. Pay

C. Status

1. Limited List

2. Unlimited List

XI. DEATH OF OFFICERS

A. Procedure

UNITED STATES
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BERKELEY

MILITARY SUBJECTS DEPARTMENT

INFANTRY DRILL REGULATIONS - STUDENT'S NOTES

5/18/18.

I. PURPOSE OF INFANTRY DRILL

A. Success in Battle

B. Discipline

C. Ceremonies

D. Salutes

E. The manual of arms infantry drill

F. Value of infantry drill proved by its use in the Navy, Medical Corps, Field Artillery, Signal Corps, etc.

II. UNITS USED IN INFANTRY DRILL

A.

III. GENERAL TYPES OF DRILL

A. Close order -

B. Extended order -

IV. DEFINITIONS

1. Alignment -

2. Base -

3. Column -

4. Depth -

5. Distance -

6. Element -

7. File -

8. Flank -

9. Guide -

10. Line -

11. Rank -

V. COMMANDING

A. Ability to command men absolutely essential to an officer.

B. Pick errors.

C. Admit error.

D. Position of commander.

E. Explanations.

F. Construction of commands.

G. Timing of commands.

VI. APPLICATION OF DRILL PRINCIPLES

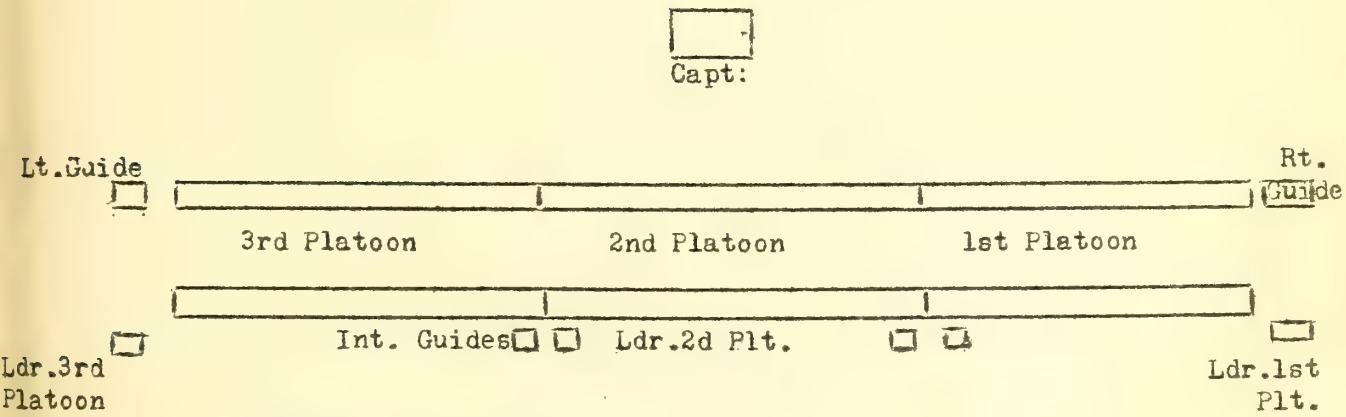
A. Tracing the similarity of drill movements for units of various sizes.

1. Movements on the fixed pivot -

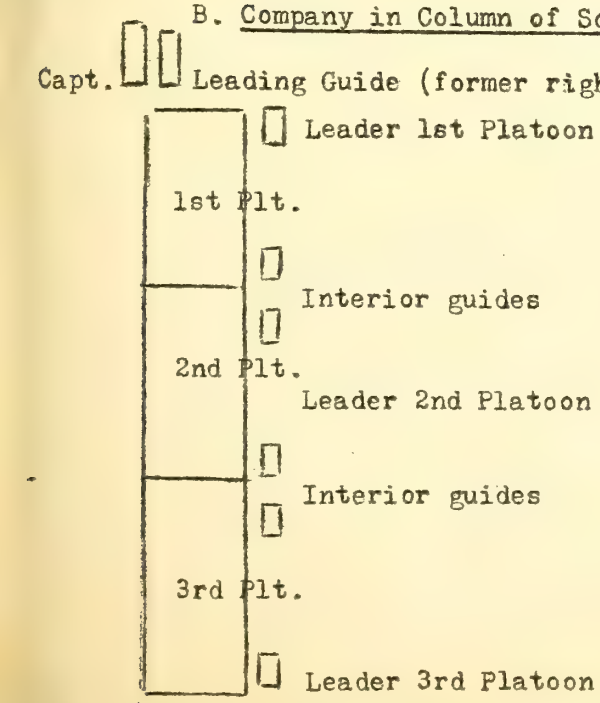
2. Movements on the moving pivot -

VII. POSITION OF OFFICERS, GUIDES & FILECLOSERS IN VARIOUS FORMATIONS

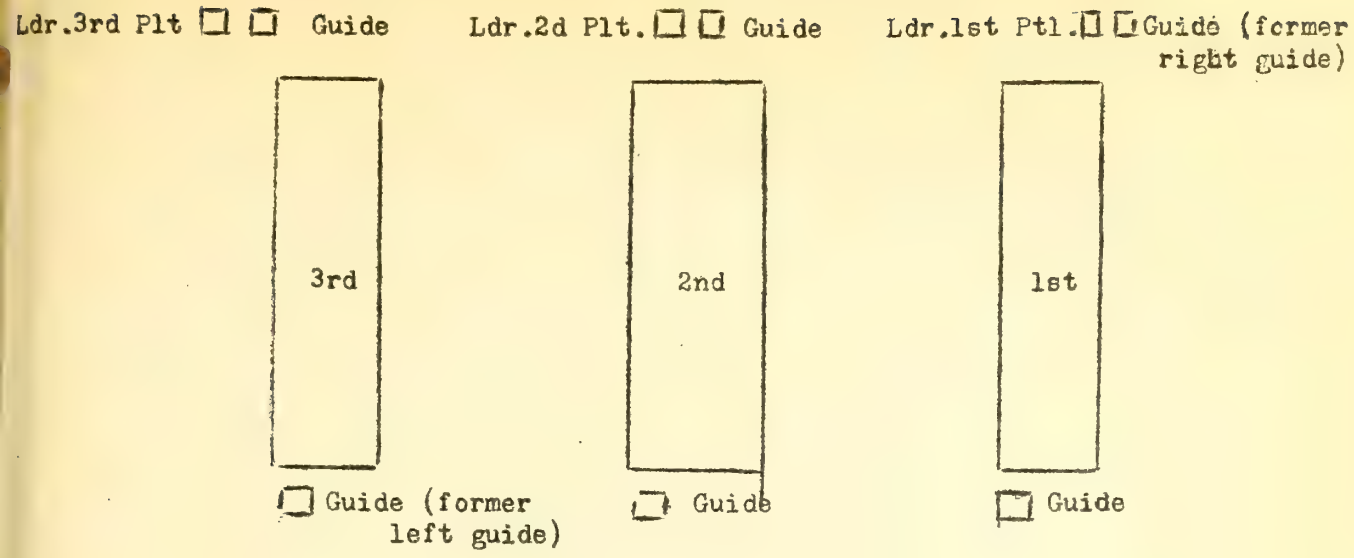
A. Company in Line



B. Company in Column of Squads



C. Company in Line of Platoons



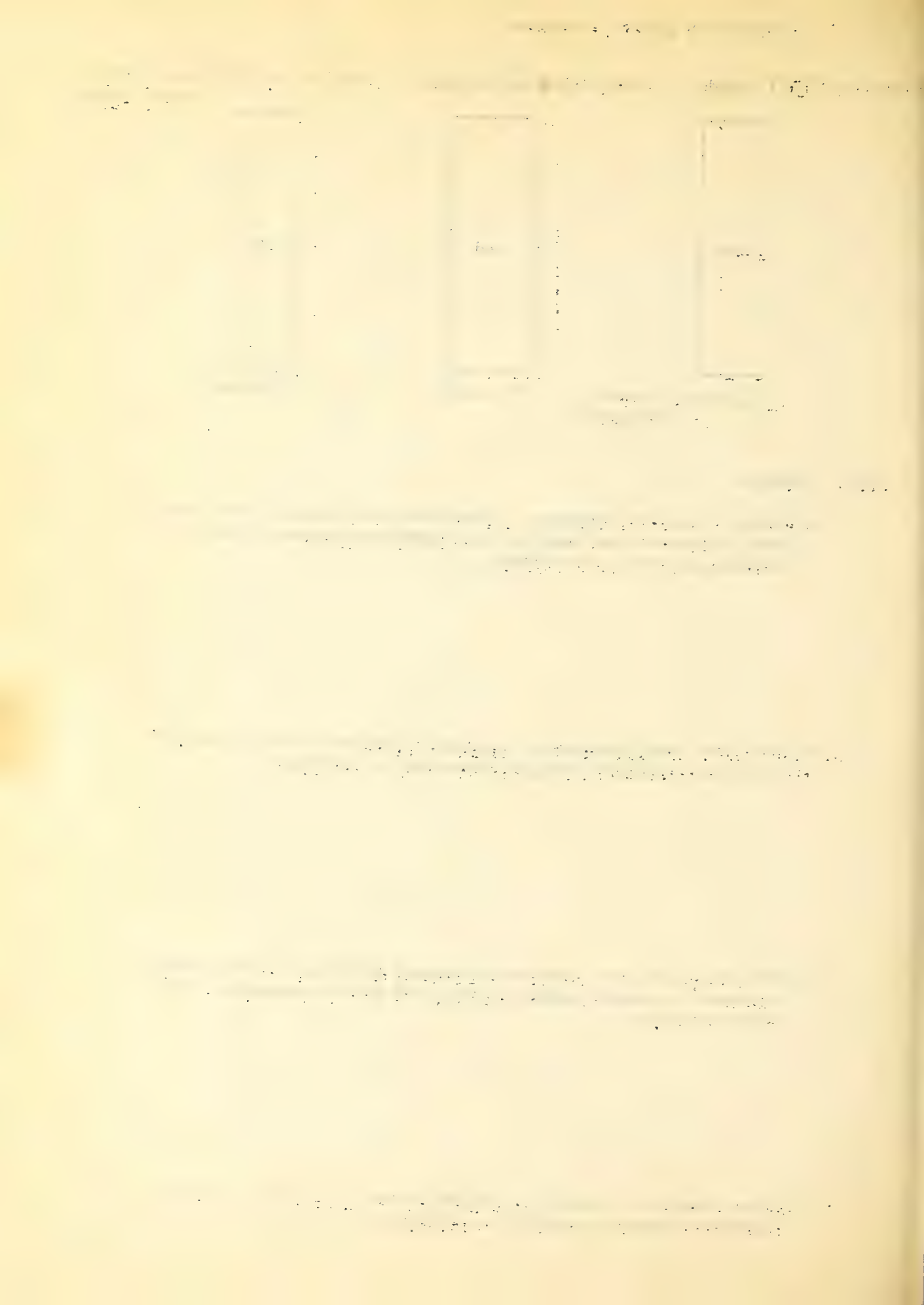
VIII. PROBLEMS

A. Given, a line of platoons. Place the last squad of the left hand platoon at the head of the right hand platoon without changing direction or halting.

B. Place the rear platoon of a column of platoons at the head of the column without changing direction or halting.

C. Put the right hand squad of a company into line at the head of a column of squads moving to the left in two commands. Give four solutions.

D. Place the rear squad in a column at the head of the column without changing direction or halting.



E. Place the right hand squad of a line on the left without changing direction or halting.

F. Give exact position of the right guide of a company after the execution of each of the following commands, the first command being given from a normal company front; succeeding commands being given after the preceding command has been executed.

1. "Platoons right, by squads."

2. "Squads right."

3. "Platoons right, by squads."

4. "Squads right about."

5. "Platoons column left."

6. "Platoons right, front into line, double time."

APPENDIX K2

Contains the following:

Copy of Syllabus of SIGNALLING DEPARTMENT
Furnished to Cadets. (7 pages)

SYLLABUS OF THE DEPARTMENT OF SIGNALLING

METHODS OF COMMUNICATION USED ON AIRPLANES

I. AURAL

1. Radio Telegraphy
2. Radio Telephone

II. VISUAL

1. Lamp
2. Panneau

III. INSTRUCTION IN SIGNALLING

1. Standards of Course
2. Instruction in Sending
3. Method of holding key
4. Arm and wrist motion
5. Sending Practice
6. Instruction in Receiving
7. Sending Groups
8. Passing Out System

I -- AURAL.

1. Radio Telegraphy.

A. Source of Power.

a. Storage battery.
b. Fan driven generator.

B. Primary Circuit.

a. Keys (Pilot and observer.)
b. Coil, adjustable vibrator.
c. Transformer.

C. Closed or Oscillating Circuit.

a. Spark Gap, adjustable.
b. Condenser.
c. Oscillation transformer, primary inductance.

D. Open or Radiating Circuit.

a. Aerial.
b. Oscillation transformer, secondary inductance
c. Hot wire ammeter.
d. Ground.

E. Important Accessories.

a. Safety plug.
b. Aerial winch.
c. Aerial Weight.
d. Fairlead.

F. Installation of Set on Airplane; position of

a. Keys.
b. Generator or Battery.
c. Transformer.
d. Aerial.
e. Ground.
f. Fairlead.
g. Aerial winch.

G. Operation of Set While in Flight.

a. Precautions:

Safety plug.
Releasing aerial.
Pin pointing radio station and battery

b. Battery Communication:

Directional sending.
Interference.

H. Communication with headquarters with respect to infantry.

I. Cooperation with artillery.

J. Pre-arranged signals.

2. Radio Telephone.

A. Radio Telephone Equipment.

a. Source of power; fan driven generator.
b. Transmitter; connections, etc.
c. Antenna.
d. Interphone set.

B. Installation of Sets on Airplane.

a. Radio telephone.

Generator
Transmitter
Fairlead
Aerial winch
Aerial

b. Interphone.

C. Communication.

a. Between airplanes in formation flying.
b. Between station on the ground and airplane.
c. Between pilot and observer on same plane.

II--VISUAL

1. Lamp.

Practice with the lamp is given during the evening classes in the barracks and in day classes as well. This practice is given as soon as the cadet has sufficient knowledge of code work to enable rapid progress in visual receiving. Approximately six hours is devoted to this subject.

2. Panneau.

Instruction with the miniature panneau is given during the seventh week and continued thereafter. The requirements of visual signalling by the lamp and arc panneau are four words per minute. This is attained prior to the end of the course, as proficiency in this work is developed automatically by the aural training in both sending and receiving.

III--INSTRUCTION IN SIGNALLING.

1. Requirements of Course.

The requirements of the department of Signalling consist of sending and receiving at the rate of eight words per minute in the International Morse Code. This refers directly to mixed letters and numerals and not plain English. The passing out requirements are ten words per minute in both sending and receiving and is explained further on in this syllabus.

2. Instruction in Sending.

The method of instruction in sending which is given during the first week and thereafter should be complied with very closely by the cadets. It is necessary to send at the rate of eight to ten words per minute almost perfectly at the end of the course. Due to the conditions of operating a Radio set in an airplane these methods of instruction are necessary. To maintain perfect communication on the front, it is essential that all cadets send alike, that is with special reference to rhythm. The operator who is receiving the messages at the battery station on the ground must hear the same type of sending from all the men in the air thereby reducing interference and jambing.

3. Method of Holding Key.

The key is grasped lightly between the first two fingers and the thumb of the right hand. The index finger gives the downward motion of the key lever. The thumb aids the spring in bringing the key lever to its original position. The middle finger prevents the index finger from moving forward while sending and the thumb prevents the index finger from moving backward during operation. This gives positive control of the key for all positions during operation as, up and down, backward and forward which is very necessary.

4. Arm and Wrist Motion.

The arm is relaxed until perfectly free, wrist is loose and the elbow resting on the table. During the first week of practice cadets should send very slowly with the full assurance that the arm is relaxed. The wrist will drop almost to the table while making a dash and approximately half that distance in making a dot. Cadets who have difficulty in relaxing the arm to any extent should report the fact to the Radio Instructor during the class.

5. Sending Practice

Every character, either letter or numeral has a characteristic sound. When these individual characters are received they are recognized entirely by sound. The letter "C" may be taken as an example. The code construction of this letter is -.-. dash dot dash dot and should sound as dah da dah dit. Notice that the final dot is very short. Always favor or slightly emphasize the last dash of each character as this expresses the individual sound of the different characters very clearly.

Great care should be taken with respect to speed during the first practice hours. Never send any faster than you can and still be capable of making perfect signals. Cadets who continually oversend their code, that is, those who make successive mistakes while sending, will have difficulty throughout the entire course. The proper time to eliminate this tendency to error, is

at the beginning of the course and not later. These faults are difficult to eradicate after a few weeks of practice. Accuracy is what is required in this course not speed. Cadets who begin sending slowly but accurately, will encounter no difficulty in attaining a speed of ten words per minute. Proficiency in speed will come in time but accuracy and speed together require the method of practice as outlined above.

6. Instruction in Receiving.

This instruction commences during the first week and continues throughout the entire course. Cadets should not count dots and dashes while the first practice is being given. It is impossible to count the dots and dashes of the individual characters above a speed of six words per minute. When receiving at the rate of seven or eight words per minute the characters must be recognized by sound entirely, so cadets should take the precaution to recognize the characters by sound from the beginning.

Receiving may be described as the training of the ear by sound or an education of the auditory organs. When any signal is received it is intercepted by the auditory organs and conveyed to the brain. As these individual signals are being conveyed to the brain a certain amount of resistance is offered. Upon consideration of the entire alphabet, which consists of ten numerals and twenty six letters, we find that the auditory organs offer more resistance to certain characters than to others. These particular characters are difficult for any person to receive. For instance the letter "C" is very easy for any normal person to receive at any speed up to twenty words per minute because this particular sound is conveyed to the brain with little or no resistance and is therefore recognized very readily. For this rea on the entire code is divided into three groups as follows : : :

Group one :

T M O C A N 0 9 E I R K D

Group Two :

P X F 8 L 2 U G S W Y Q

Group Three :

B 3 7 H V 5 6 4 1 J Z

Group one consists of characters which a normal person has no difficulty in receiving.

Group two consists of characters which are more difficult to receive than group one.

Group three consists of the characters which are most difficult to recognize by sound. The inability of any person to receive is limited to this group. Most of these characters are made up of dots. The auditory organs offer the greatest amount of resistance to these particular sounds as they are being conveyed to the brain within certain limits of speed.

Separate code sheets are made up of the individual groups and given to the cadets in practice as follows: : :

Considering one hour the time required to attain a certain degree of proficiency in group one, three hours will be needed for group two and five hours for group three to obtain the same proficiency. That is, cadets who are poor in the course should be given three times as much practice on a code made up of group two than the code made up of group one, and five time as much practice on group three as group one. Experience shows that the inability of a normal person to receive up to a speed of ten words per minute is due to the characters contained in groups two and three. Concentrated practice on these particular groups as described above will overcome this difficulty within a short time. Precaution should be taken in changing from one group to another. For instance, after instruction has been given on group three it is inadvisable to change to group one without first giving instruction on group two. The theory of this method of instruction requires the application of these groups to the cadet with special reference to the advancement of the individual cadets from week to week. Instruction on the groups should taper off lightly, otherwise the cadet will remain on what is known as the "critical point" for a greater amount of time than is required by a perfect receiver.

7. Sending Groups.

Cadets who are having difficulty in sending may overcome this by practicing on"sending group" three and also by devoting a certain amount of time to "sending dots".

Classification of Sending Groups : : :

Group one

T M O A N O 9 E I P G W 1 J

Group two

R K D X F 8 L 2 U S Y Q Z

Group three

C B 3 7 H V 5 6 4

The three groups are arranged for sending practice in a manner similar to that of receiving. The sending groups however are arranged so to be of advantage to cadets who are having difficulty in receiving. As outlined in the three groups it will be noticed that the characters which are the most difficult to receive are the ones made up of dots. In fact this is true of the sending groups also. Cadets who are having difficulty in receiving should practice sending a code made up of the characters of group three of the sending groups. This training develops the recognition of a sound which is made up mostly of dots. Additional practice may be taken in sending dots separately, that is, any number from two to six.

Group three of the sending groups is the particular group that is of material value to the above described instruction in receiving.

This group contains the following characters:

C B 3 7 H V 5 6 4

Cadets who have difficulty with either sending or receiving should report to the Head of this department once a week for special instruction in the different codes.

8. Passing Out System.

Cadets who are progressing rapidly in this course may be excused from further classes by passing an examination of ten words per minute in both sending and receiving. Those who pass this test are considered to have "passed out". The first "passing out" test is given during the sixth week and each week thereafter until the end of the course. A cadet who passes the required test is also excused from the final examination unless he may wish to raise his final grade. In so doing the final examination grade will be the final grade and not the previous grade given in the passing out test.

Cadets who have passed out will be notified of the grade received in this test one week previous to graduation, that is the grade in terms of eight words per minute. If a cadet is exceptionally proficient in Radio he will be given credit for such. Those who pass out during the first few weeks of the course are expected to practice fifteen minutes daily to uphold the standard of their work to that of the passing out test. A record of this will be kept by the department.

No examination will be given on Visual Signalling or Radio Theory.

APPENDIX K3

Contains the following:

Copies of Syllabi of GUNNERY DEPARTMENT
Furnished to Cadets on:

Lewis Machine Gun	(14 pages)
Marlin Machine Gun	(15 pages)
C. C. Gear	(5 pages)

LEWIS GUN SYLLABUS

LEWIS MACHINE GUN.

AMERICAN AIRPLANE TYPE.

TYPE.	Air cooled, magazine fed, Operated by two forces, 1. A part of the combustion gases. 2. The main spring.
Weight.	17¼ lbs.
Barrel length	26.056 in.
Diameter of bore.	0.300 in.
Depth of lands.	0.004 in.
Twist.	Uniform - one turn in 10 inches.
Rifling	4 Grooves.
Magazine	97 round empty - 2 7/8 lbs. 97 round full 8 1/8 lbs.
Weight of cartridge.	395 gr.
Weight of bullet.	150 gr.
Diameter of bullet.	0.308 in.
Powder - cordite.	48- 50 gr.
Muzzle velocity.	2700 ft. per sec.
Deflector bag.	Weight - 2 lbs. 15 oz.
Mounting Yoke	" - 1 lb. 1 oz.
Chamber Pressure,	50,000 lbs. to the sq. In.
Cartridge Cap.	Fulminate of mercury.

LEWIS MACHINE GUN

AMERICAN AIRPLANE TYPE.

AMERICAN AND BRITISH NOMENCLATURE OF PRINCIPLA FEATURES AND PARTS.

AMERICAN	BRITISH
I. Receiver group	I. Body Group.
1. Receiver.	1. Body.
a. Magazine Post.	a. Same.
b. Centre Key.	b. Magazine Post Centre Key
c. Receiver Locking Pin.	c. Body Locking pin
d. Safety.	d. Safety Catch.
e. Ejector Seating.	e. Same.
f. Gear Case Hinge Pin.	f Pinion Casing Hinge Pin.
g. Ramps.	g. Same.
h. Feedway.	h. Same.
i. Locking recess.	i. Same.
2. Ejector	2. Ejector.
a. Cover	a. Same.
3. Feed Cover Assembled.	3. Body Cover Assembled.
a. Feed Cover.	a. Body Cover.
b. Transverse Ribs.	b. Ribs.
c. Rebound Pawl.	c. Left Stop Pawl.
d. Stop Pawl.	d. Right Stop Pawl.
e. Magazine Pawls Spring. (Stop and Rebound Pawl Spring)	e. Stop Pawl Spring.
f. Cartridge Guide.	f. Cartridge guide Spring.
4. Feed Operating Arm	4. Feed Arm.
a. Feed Pawl	a. Feed Arm Pawl
b. " " Spring.	b. " " " Spring.
c. Right Stud.	c. Feed Pawl Axis Stud.

d. Left Stud.	d. Feed Pawl Spring Stud.
e. Centre "	e. Feed Pawl Stop Stud.
f. Feed Operating Arm Latch	f. Feed arm latch.
g. Channel Feed Operating Arm Latch	g. Same.
h. Feed operating arm finger Finger.	h. Feed Arm Tail finger
5. Guard Group.	5. Pistol Group.
a. Sear	a. Same.
b. Sear Spring.	b. Trigger Spring.
c. " Pin.	c. Sear Axis Pin.
d. Trigger	d. Same.
e. Butt latch	e. Same.
f. Guard.	f. Trigger guard-Pistol Grip.
6. Gear Casing Assembled	6. Pinion Casing Assembled.
a. Gear Casing.	a. Pinion Casing.
b. " Stop.	b. " Pawl.
c. " " Pin.	c. " " Axis Pin.
d. " " Spring.	d. " " Spring.
e. Collet Pin.	e. Tension Screw
f. Gear Assembled.	f. Pinion Assembled.
1. Gear.	1. Pinion.
2. Mainspring.	2. Return Spring.
3. " Casing.	3. " " Casing.
4. " Rivet.	4. " " Rivet.
5. " Collet.	5. " " Hub.
7. Spade Grip.	7. Spade Grip.
a. Spade Grip Tang.	a. Same.
b. Interrupted Flanges	b. Same.

II. Barrel Group.

1. Barrel.

a. Muzzle.

b. Breech.

c. Gas Port.

d. Rifling.

1. Lands.

2. Grooves.

f. Shoulder.

g. Barrel positioning Stud.

2. Barrel Retaining Nut.

3. Recoil Check Assembled.

a. Recoil Check.

b. Web.

4. Locking piece Assembled.
(a) Locking piece.

(b) Rear sight Base.

5. Gas Chamber.

6. Gas Regulator cup.

7. " Chamber Gland.

8. " Cylinder

9. " Regulator Key.

10. Front Sight Base.

11. Gas Reg. Key Stud.

12. " Cylinder Casing.

II. Barrel Group.

1. Barrel.

a. Muzzle.

b. Breech.

c. Gas Vent.

d. Rifling.

1. Lands.

2. Groves.

f. Shoulder.

g. Same.

2. Same.

3. Same.

a. Same.

b. Same.

4. Same.
(a) Same.

(b) Same.

5. Same.

6. Gas Regulator.

7. " Chamber Gland.

8. " Cylinder.

9. Same.

10. Same.

11. Gas Reg. Key Positioning Stud.

12. Same.

III. Rack and Piston Group.
(Operating Rod Group)

1. Rack.

2 a. Rack Teeth.

b. Sear Bent.

III. Rack and Piston Group.
(Operating Rod Group).

1. Piston Rack.

a. Piston rack Teeth.

b. Same.

c. Striker.
d. Striker Post.
e. " Fixing Pin.
f. Charging Handle Slot.

2. Piston.
a. Head.
b. Flanges.

3. Charging Handle.

IV. Bolt Assembled.

1. Bolt.
2. Extractors.
3. Cam Way Groove.
4. Locking Lugs.
5. Feed Operating Stud.
a. Guide Lugs.
b. Boss.
c. Worm.

V. Magazine Group.

1. Magazine Pan.
2. Magazine Centre.
3. " Latch.
4. " " Spring.
5. Cartridge Separator Pins.
6. " Spacer Ring.
7. Magazine Top Plate

VI. Mounting Yoke Assembled

1. Mounting Yoke Clamp Key.

c. Same.
d. Same.
e. Same.
f. Cocking Handle Slot.

2. Piston.
a. Head.
b. Flanges.

3. Cocking Handle.

IV. Bolt Assembled.

1. Bolt.
2. Same.
3. Same.
4. Locking Lugs.
5. Feed Arm Actuating Stud.
a. Same.
b. Same.
c. Same.

V. Magazine Group.

1. Magazine Pan.
2. Magazine Centre Block.
3. Same.
4. Same.
5. Magazine Pegs.
6. Spacer Ring.
7. Same.

VI. Mounting Yoke Assembled.

1. Same.

SEQUENCE OF ACTION

BACKWARD MOVEMENT

1. ACTION OF THE GASES.

On the cartridge being primes, the cordite is changed into gas with a chamber pressure of 25 tons per sq. inch. This forces the bullet down the barrel so as to give a muzzle velocity of 2700' per sec., 4 inches from the muzzle, part of the gases are trapped at the gas port. They pass into the gas chamber gland, thru the port in gland, then thru the port in gas regulator, thru gas chamber into the gas cylinder, striking the cup shaped head of the operating rod and driving it to the rear. The remainder of the gases striking against the web of the recoil check, help to take up recoil of the gun.

2. ACTION OF PISTON ROD AND RETURN SPRING.

During the first 1 1/8" of backward travel, the striker post travels along the straight side of the camway groove. At the same time, the teeth of the pinion being engaged in the teeth of the rack, rotate the pinion and commence to wind the return spring. This 1 1/8" is a safety device to insure that all the gases have dispersed before the bolt is unlocked.

3. UNLOCKING OF BOLT AND EXTRACTION.

The right side of the striker post now bears on the right side of the curved camway groove and rotates the bolt 1/8 turn to the left. This frees the Locking lugs from the locking recesses, thus unlocking the bolt. The striker now bears on the rear end of the camway-groove and carries it back. At the same time the extractors are gripping the empty case in the chamber and withdrawing it.

4. ACTION OF THE EJECTOR.

As the bolt travels to the rear the left guide lug on the actuating stud strikes the rear end of the ejector, which, being pivoted, forces the front end across the face of the bolt and so ejecting the empty case through the ejection opening.

5. ENGAGEMENT OF THE SEAR.

The piston rod and bolt travel still further to the rear until the bent of the rack is clear of the bent on the sear. The return spring is now wound up to 11 more pounds than its previous tension. The force of the explosion now being spent, the return spring will carry the piston and bolt forward 5/8"; and if pressure on the trigger has been released, the bent of the sear will engage with the bent on the rack, and the gun stops fully cocked.

6. ACTION OF FEED ARM AND PAWL.

During the backward movement of the bolt the boss on the actuating stud, working in the curved channel of the feed-arm finger, moves the feed-arm from right to left. The feed pawl, being engaged in a corrugation on the magazine rotates it one cartridge-breadth clock-wise. At the same time, the feed pawl spring post passes away from the arm of the right stop pawl, and allows it to come out and engage in the next corrugation of the magazine, thus preventing it from rotating too far. At the same time, the left stop pawl rides over a projection on the magazine and engages behind it, thus preventing any rebound.

7. ROTATION OF MAGAZINE AND FEEDING OF CARTRIDGE.

As the magazine rotates the cartridge is fed under the cartridge guide spring and into the feedway by means of the plates on the rim of the magazine and separating pegs, assisted by the slope of the center block.

FORWARD MOVEMENT

1. RELEASING OF THE SEAR.

Upon pressure being applied to the trigger, the bent of the sear becomes disengaged from the bent of the rack.

2. ACTION OF PISTON ROD AND BOLT.

The unwinding of the return spring now carries the piston rod forward, left side of the striker post bearing against the left side of the curved camway groove, carries the bolt with it, the bolt being prevented from turning, because the resistance lugs are in the longitudinal guides.

3. STRIKING OF CARTRIDGE INTO CHAMBER.

As the piston rod and bolt move forward the top extractor hits the base of the cartridge in the feedway and directed by the cartridge and bullet guides, it is forced into the chamber. When it is almost home the extractors spring over it and engage the rim of the cartridge.

4. LOCKING OF THE BOLT.

When the bolt is fully forward and the locking lugs opposite the locking recesses, the left side of the striker post bears on the left side of the curved camway groove and rotates the bolt 1/8 turn to the right, thus locking the locking lugs in the locking recesses and so locking the bolt.

5. PRIMING THE CARTRIDGE.

The striker post now travels along the straight part of the camway groove for a distance of 1-1/8" and the striker enters the striker-way on the face of the bolt and primes the cartridge. This 1-1/8" of straight portion is a safety device to insure that the bolt is properly locked before the cartridge is primed.

6. FEED ARM AND PAWLS.

During the movement of the bolt the boss on the actuating stud, working in the curved channel of the feed-arm finger, moves the feed-arm from left to right. The feed pawl rides over a projection on the magazine and engages behind it, ready for the backward movement. The feed pawl spring post bears on the arm of the right stop pawl and forces it out of action. The left stop pawl remains stationary and prevents the magazine from rotating anti-clockwise.

7. POSITION OF EJECTOR.

During the forward movement of the bolt the face of the bolt strikes the front end of the ejector which being pivoted forces the rear end into the boltway. This leaves the gun ready for the first position of the backward movement.

CARE OF THE LEWIS MACHINE GUN.

IMPORTANCE OF CARE.

It must be born in mind that 75% of the stoppages that occur with the Lewis gun are due to careless cleaning and inattention to small points. Consequently one of the most important things in a course in gunnery is to learn these points and form the habit of attending to all of them.

I. Oiling.

If possible use only P924 Oil as it is designed to withstand low temperatures such as are met with at high altitudes. If this can not be obtained use "Lewis gun oil for low temperatures" or 1/2 Rangoon and 1/2 Instrument oil. In this case only the essential working parts should be oiled and only slightly.

The parts of the gun that require the most frequent oiling are:

1. Head of piston.
2. Striker post and camway groove.
3. Locking recesses.
4. Around magazine post and underneath the feed arm.

The parts of the gun to slightly oil are:

1. Teeth on gear and rack.
2. Sides of gear and collet.
3. Pawls at bearings.
4. Surface of bolt.
5. Channel in feed arm.
6. Ribs on under side of feed cover.
7. Operating stud worm.
8. Ejector.

If P924 Oil is obtainable the gun can be oiled more freely.

Never oil the gas cylinder for firing. The carbon from the gases will mix with the oil and form a thick compound. This will set quickly when in the cold air and cause the gun to stop.

If the gun is not to be used any part may be oiled freely to prevent rust but it should be wiped clean and oiled as described above before firing.

II. Points to attend to before flight.

1. Overhaul all working parts of the gun. See that it is clean and is oiled as directed in I. Oiling.
2. Wipe barrel and gas cylinder perfectly dry.
3. See that the large hole of the gas regulator is to the rear.
4. See that the charging handle cannot be pulled out.
5. See that the main spring is at the proper tension, about 11 pounds one inch back of the forward position.
6. Examine the cartridge guide.
7. Try the pawls to see that they are in working order.
8. Work the charging handle back and forth first without, then with the mainspring gear in place and notice if there is any unnecessary friction.
9. See that the deflector is properly in place.
   (1) The deflector bag must be large enough to hold the empty cases from several magazines.
   (2) The bag must be stiffened on account of the wind.
   (3) The clamp fastening the deflector to the receiver should be hammered fairly tight.
10. See that the mounting yoke latch is on the right in from front.
11. See that the battle sights are fixed properly.
12. Fire 20 rounds.

III. Points to note during flight.

1. Always be sure the gun is in working order. Take the magazine off and work the charging back and forth now and then to see that it is not becoming clogged. If it is extremely cold fire a round now and then.
2. See that the mounting yoke and deflector clamps do not work loose.
3. Always have a full or nearly full magazine on the gun.

IV. After flight:

1. Strip the gun and clean thoroughly.
   (1) Clean the barrel from the muzzle. (Aerial guns only.- Accuracy is sacrificed to save wear on the chamber.)
      (a) Remove superficial fowling by means of a piece of dry flannelette.
      (b) If possible run boiling water through the barrel to loosen the internal fowling. Special solutions for nickeling and powder fouling may be used if available.
      (c) Thoroughly dry the barrel with clean flannelette and finally oil the bore.
      (d) On the next and alternate days for ten days and once a week after that the barrel should be cleaned out with dry flannelette and re-oiled.
   (2) To clean the gas cylinder:
      (a) Run the wire brush through.
      (b) This is followed by a piece of clean flannelette wrapped around the wire brush.
      (c) When clean run through a slightly oily mop.
      (d) The next day and every other day for ten days and every week after that the gas cylinder should be cleaned and re-oiled.
   (3) The gas regulator, gas chamber, piston head and grooves should be scraped free of any deposit and left slightly oily.
   (4) Clean all working parts and oil as directed under I.
   (5) After 500 or 600 rounds have been fired the gas cylinder should be removed to clean the gas port and the extractors should be removed and cleaned. This should not be done every time the gun is cleaned as the threads on the gas cylinder would become worn and leak and the extractor springs would be weakened.
2. Enter in a log book the number of rounds fired. Keep a history of each barrel and of the gun.
3. Leave the mainspring at working tension.
4. Empty all magazines and test as follows before refilling:
   (1) Spin in the loading handle to detect undue friction.
   (2) Rotate on the gun to see that the magazine pan is true.
   (3) See that the interior separators are straight and firm.
   (4) See that the lip of the magazine center is not bent.
   (5) Be sure that the collet groove is clean.
   (6) See that the magazine latch is working perfectly.

V. Inspect ammunition for:

1. dents,
2. deep set caps,
3. defective bullets,
4. split cases,
5. insufficient powder charge by weighing if possible.
6. thick or thin rims.

Try each round in a spare barrel.

The testing of ammunition is most important as the passing of one defective round through carelessness may cause very serious results when in the air.

VI. Tools and spare parts to be taken in flight are:

1. Dummy round,
2. screwdriver,
3. spring balance,
4. some device for pulling back the charging handle with both hands.
5. Clearance plug,
6. loading handle,
7. extra cartridge guide,
8. " gear casing assembled,
9. " bolt,
10. " operating rod.

VII. General inspection examine:

1. piston and gas cylinder,
2. bolt and camway groove for wear,
3. feed arm and slot for wear,
4. pawls and feed cover,
5. striker post for wear.

See if striker comes through the face of the bolt.

VIII. Care of spare parts.

See that they fit the gun.

They should be checked over once a week and then wrapped in greased paper and returned to the receptacles provided.

Three Types of Fouling.

1. Superficial fouling. Caused by dirt or powder. Can be removed with flannel.

2. Internal fouling. Caused by powder and carbon getting into pores of metal which have opened up due to heating of the barrel. When gun cools the metal contracts and imprisons the deposits. Boiling water is used for this type of fouling in order to open the pores of the metal and permit the dirt to be removed.

3. Metallic Fouling. Deposits of metal caused by the passage of the bullet through the barrel. Not usually present in any quantity until about 500 rounds have been fired. Removed by the use of metal fouling solvents.

Preparation and Use of Cleaning Solutions.

Soda Solution

A saturated solution of sal soda (bicarbonate of soda, $Na\,HCO_3$). A strength of at least 20% is necessary. The spoon referred to in the directions is the model 1910 spoon issued in the mess outfit.

Sal Soda -- $\frac{1}{4}$ pound = 4 heaping spoonfuls.

Water -- 1 pint = 32 spoonfuls = 1 model 1910 cup filled to upper rivets. The sal soda will dissolve more readily in hot water and it is better to have the solution warm when using it. This solution is used to remove powder fouling. A convenient method is to insert the muzzle of the barrel into the can of solution and pump the barrel full a few times. It can also be used to soak patches to be run through the bore.

SWABBING SOLUTION

Ammonium persulphate -- 60 grains = $\frac{1}{2}$ spoonful smoothed off.
Ammonia, 28% -- 6 ounces = 3/8 pint = 12 spoonfuls.
Water -- 4 ounces = $\frac{1}{4}$ pint = 8 spoonfuls.

Dissolve the ammonium persulphate in the water and add the ammonia. Keep in a tightly corked bottle; pour out only what is necessary at the time, and keep the bottle corcked.

This is a dilute metal fouling solution which can be used on patches to swab out the bore. The amount of swabbing required can be determined only by experience, assisted by the color of the patches. Swabbing should be continued however, as long as the wiping patch is discolored by a bluish-green stain. Normally about 2 minutes work is sufficient, then dry barrel thoroughly and oil.

STANDARD METAL FOULING SOLUTION

Ammonium persulphate -- 1 ounce = 437 grains = 2 medium heaping spoonfuls.
Ammonium carbonate -- 200 grains = 1 medium heaping spoonful.
Ammonia, 28% -- 6 ounces = 3/8 pint = 12 spoonfuls.
Water -- 4 ounces = $\frac{1}{4}$ pint = 8 spoonfuls.

Powder of persulphate and carbonate together, add the ammonia and water, stir thoroughly, and allow solution to stand for at least half an hour before using. The above quantity is sufficient to clean 20 guns.

The solution should be kept in a strong bottle, tightly corked. It can be used twice (no more) and used solution should not be mixed with unused, but bottled separately. The solution should be used within 30 days, The solution should not be used in a warm barrel. An experienced man should mix the solution and superintend its use. Neither of these ammonia solutions has any appreciable action on steel when not exposed to the air, but if allowed to evaporate on steel, they attack it rapidly. Care should therefore be taken that none spills on any part of the gun and that the barrel is washed out promptly with soda solution. These ammonia solutions are expensive and should be used economically.

If after cleaning with soda solution, patches of metal fouling are seen upon visual inspection of the bore, the standard metal foulding solution must be used. The first application of the sodatsolution removes the greater portion of the powder fouling and permits a more effective and economical use of the ammonia solution. Have the barrel free from oil, clean, and dry. Plug the bore from the breech with a cork at the front of the chamber or where the rifling begins and close the gas port. Slip a 2 inch section of rubber hose over the muzzle and fill the bore with the standard solution to at least 1/2 inch above the muzzle. Let the barrel stand for 30 minutes (some hand books say two hours), remove the hose and plug and swab out thoroughly with soda solution to neutralize and remove all trace of ammonia and powder fouling. Wipe the barrel clean, dry, and oil. With few exceptions one application is sufficient, but if all fouling is not removed, as determined by careful inspection, repeat as discribed above.

N O T E: Sal soda is not sal ammonia. The latter is ammonium chloride, NH_4Cl.

Lewis Gun
Stoppages and Jams.

Immediate Action applied when a cessation of fire occurs.

I. Rotate Magazine.
   a. If free, change Magazine
   b. Ifnnot free, cock gun, relay and fire

II. If gun will not fire, rotate Magazine
   a. If free, change Magazine
   b. If not ffee, cock gun, relay and fire.

III. If gun still will not fire rotate Magazine
   a. If free, change Magazine
   b. If not free, cock gun, raise safety catch

Examination of Gun, after immediate action fails

Open Deflector and examine receiver to determine whether jam may be reduced without taking off magazine. Do not attempt to make replacements unless damage or breakage is apparent except in the case of the cartridge guide.

Distinction between Stoppages and Jams.

Stoppages may be remedied by the application of the immediate action given above. If gun does not respond to immediate action, cessation of fire is said to be due to a Jam.

Cessation of Fire may be due to

Every cessation of fire is classified as either a stoppage or jam.
1. Defective Ammunition
2. Defects in Magazines
3. Breakage of wear of parts
4. Gun not properly adjusted or cared for

These Causes Resulting in

I. Failure to Feed, no round taken from magazine.
   1. Empty Magazine
   2. Space in Magazine
   3. Feed Pawl does not act
   4. Rebound Pawl does not act
   5. Broken Mainspring.

II. Interference with Feed, round caught and held in Feedway.
   1. Guide does not act (weak cartridge guide (broken " " "
   2. Magazine defective
   3. Top Extractor broken

III. Failure to Prime Round, round taken from magazine, fed into chamber but not fired.
   1. Defective ammunition
   2. Broken or worn striker
   3. BBolt does not lock defective parts, or ammunition (a) Pasted case (b) Bulged case (c) Burrs in cam way groove.

IV. Failure to Extract.

1. Dull Extractors, or Extractors which have insufficient bearing surface to accomplish extraction.
2. Hard extraction, due to bulged cases, etc.
3. Round with base which does not permit extractors to hold
4. Lack of sufficient gas

V. Failure to Eject.

1. Full Deflector Bag
2. Broken Ejector
3. Bolt which grasps cases and does not permit them to eject freely, examine cases for mark of ejector
4. Extractors which hold case loosely, case falls off bolt

Stoppages, typical
These stoppages are listed here as they are the most liable to occur.

I. To be remedied in the air by immediate action.

1. Weak cartridge guide spring
2. Defective ammunition causing misfire
3. Defective magazine due to damaged or badly loaded magazine.
4. Friction or burrs on striker post or camway groove

Jams.

I. Cured in air, but must get out of action until cured.

1. Broken cartridge guide spring
2. Broken return spring
3. Weak or broken extractors
4. Full or loose deflector bag
5. Broken feed pawl or spring
6. Gas regulator key missing

SYLLABUS OF MARLIN AIRCRAFT GUN INSTRUCTION

OUTLINE OF WORK

I. General description.

II. Technical description.
- 1. Stationary portions.
  - A. Barrel and receiver group.
    - a. Barrel.
    - b. Gas cylinder.
    - c. Receiver.
    - Lock Container.
  - B. Three body plates and their stationary attachments.
    - a. Right side plate.
    - b. Left side plate.
    - c. Bottom plate.
- 2. Moving portions.
  - A. Slide and attachments.
  - B. Bolt.
  - C. Carrier.
  - D. Trip.
  - E. Feed wheel.

III. Sequence of mechanism.
- 1. Priming the first shot.
- 2. Action of the gases.
- 3. Backward action of the slide and bolt.
- 4. Backward action of the shell and cartridge extractors.
- 5. First action of the feed lever.
- 6. Action of the carrier.
- 7. Second action of the feed lever.
- 8. Forward action of the slide and bolt.

IV. Stripping and assembling order

V. Stoppages.

VI. Care and cleaning.
B.D.A. Firing.

I. GENERAL DESCRIPTION.

NAME. Marlin Aircraft Gun. Caliber .30 Max. Rate of Fire = 680 shots per minute.
WEIGHT. 23 1/2 pounds.
TYPE. Air cooled.
Belt fed.
Worked by two forces.
1. A part of the combustion gases.
2. The action spring.

TO LOAD. Pull charging slide to half cock.
Insert belt in fed way from left to right.
Pull belt up until first round is against the cartridge stop.
Let the charging handle fly forward.
Pull charging slide back to full cock and let fly forward again.

TO UNLOAD. Draw charging slide to full cock.
Push forward on the feed throw off.
Withdraw the belt to the left.
Round in the chamber may be fired, or ejected by pulling charging slide to the rear.

FIRING. Gun is fired only by synchronizing gear. The trigger motor of the gear actuates either the tail of the trigger or the vertical projection of the trigger above the lock container. (According to the type of gear.)

SYNOPSIS OF ACTION. Bullet passes the gas port in the barrel - part of the combustion gases pass through the port and impinge on the head of the piston - recoiling portions are moved to the rear as the piston is forced to the rear - empty case is ejected - when the force of the gases is expended the action spring comes into play - moving parts are carried back to the firing position - new round is fed into the chamber.

II. TECHNICAL DESCRIPTION

The gun may be divided into two portions.

I. Stationary portions.
II. Moving portions.

I. The stationary portions consist of the BARREL AND RECEIVER GROUP with the three BODY PLATES and their stationary attachments.

1. Barrel and receiver group.

a. Barrel.
Gas port.
Chamber.
Shell extractor recess.
Bullet point guide.
Barrel lock notch.

b. Gas cylinder.
Gas cylinder bracket.
Gas cylinder block.
Gas cylinder block positioning lugs.
Gas adjuster barrel and pin.
Gas adjuster, including gas adjuster thimble, gas adjuster rivet and gas adjuster screw.

c. Receiver.
Ejector.
Ejector spring and plunger.
Cartridge retainer plunger.
Buffer block and springs.
Ejection opening.
Locking recess.
Also made to take. ------- Trip.
Barrel Lock.
Receiver plug.
Bolt.
Slide.
Carrier.
Barrel.
Lock container.
Body plates.
Trigger spring.
Chamber guide.

d. Lock container.
Trigger.
Sear.
Hammer.
Hammer spring.
Hammer spring guide.

2. Body plates.
   a. Left side plate.
      Feed way.
      Bullet guide.
   b. Right side plate.
      Observation slot.
      Belt way.
      Guide for charging slide retaining lug.
      Charging slide retaining lug and screw.
      Feed throw off, feed throw-off screw and spring.
      Ratchet lever and ratchet lever pawl.
      Feed lever and feed lever stop stud.
      Charging slide, and charging slide guide, and tension spring.
      Inspection opening cover cartridge guide and tension spring.
      Observation slot cover, observation slot cover cartridge guide, observation slot cover spring.
   c. Bottom plate.
      Feed wheel supports.
      Cartridge stop.
      Cartridge extractor cam.
      Cartridge extractor cam support and carrier stop.
      Cartridge extractor cam spring.
      Carrier stop screw and spring.
      Rear mounting bracket.
      Feed wheel dog and spring.

II. The Moving portions consist of the ------
      Slide and attachments.
      Bolt.
      Carrier.
      Feed wheel.
      Trip.

1. Slide.
   Piston and piston rod.
   Piston rod lock pin.
   Action spring.
   Action spring guide.
   Belt guide.
   Cartridge extractor.
   Cartridge guides. (right and left.)
   Carrier cam.
   Bolt pin hole.
   Slide cam groove.
   Feed lugs.
2. Bolt.
   Firing pin, stop pin and spring.
   Shell extractor, pin and spring.
   Gas escape hole.
   Rear fin and cam slot.
   Front triangular fin.
3. Carrier.
   Carrier dog.
   Carrier dog spring.
   Carrier dog plunger.
   Carrier pin.
4. Feed wheel.
   Feed wheel shafts (2) and spring.
5. Trip.
   Trip arm.
   Trip nose.
   Trip center.

INSTRUCTIONAL SEQUENCE OF MECHANISM.

1. Priming the first shot.
2. Action of the gases.
3. Backward action of the slide and bolt.
4. Backward action of the shell and cartridge extractors.
5. First action of the feed lever.

The force of the gases now being expanded the action spring begins to extend carrying forward the slide and bolt.

6. Action of the carrier.
7. Second action of the feed lever.
8. Forward action of the slide and bolt.

1. Priming the first shot.
   Trigger depressed.
   Hammer disengaged.
   Hammer actuated by hammer spring strikes the firing pin.
   Cartridge primed.
2. Action of the gases.
   Gas comes through gas port.
   Impinges on head of piston.
   Forces slide to rear.
   Compressing the action spring.
3. Backward action of the slide and bolt.
   As slide moves to the rear, bolt pin raises rear end of bolt out of locking recess.
   Nose of trip under pressure of the sear spring rides up into slide cam groove.
   Bolt pushes back hammer and compresses hammer spring.
4. Backward action of shell and cartridge extractors.
   Shell withdrawn from chamber by the shell extractor.
   Carried back until base strikes the ejector.
   Thrown out through the ejecting opening.
   Cartridge extractor draws round from belt onto the carrier.
   Cartridge guides steady the cartridge into position.
   Backward motion of slide arrested by buffer block and springs.
5. First action of the feed lever.
   As slide moves to the rear, the front feed lug forces lever to rear.
   Ratchet lever is raised.
   Ratchet lever pawl ratchets over the new tooth and engages above it.
6. Action of the carrier.
   As the slide moves forward, the carrier cam bears on carrier dog.
   The slide forces carrier dog out of the way as it moves to rear.
   It then snaps into place in notch of carrier cam.
   Rear end of carrier is depressed. Front end is raised.
   Upward swing is stopped by carrier stop stud.
   As soon as slide is clear of carrier dog the carrier drops again.
   Cartridge is then supported at its rear end by the cartridge retainer plunger.
7. Second action of the feed lever.
   As slide moves forward, reaf feed lug forces feed lever forward.
   Ratchet lever is forced down.
   Feed wheel is rotated one tooth clockwise, from firer.
   Next cartridge is brought into position in the feed way.
8. Forward action of slide and bolt.
   As bolt moves forward, hammer is forced down until engaged by the sear.
   Bolt reaches the forward position, shell extractor springs over base of round in chamber.
   Bolt pin riding in the cam slot forces down the rear end of the bolt thus locking the breech.

Nose of trip rides out of slide cam groove, releasing the sear.
Hammer now held back only by the trigger.
Cartridge extractor with aid of cartridge extractor cam, grips round in belt.
Forward motion of slide limited by piston rod shoulder striking gas cylinder block.

ORDER OF STRIPPING.

Cock gun first

1. Unscrew lock container screws. (See precaution 1.)
2. Remove lock container.
3. Remove trigger spring.
4. Remove receiver plug.
5. Unscrew side plate screws.
6. Remove left side plate.
7. Remove the trip.
8. Remove right side plate.
9. Remove bottom plate.
10. Remove gas cylinder.
11. Remove carrier pin and carrier.
12. Lock back action with the bolt pin.
13. Remove the barrel.
14. Remove bolt pin, letting action extend gently.
15. Remove slide.
16. Remove bolt.
17. Remove action spring from slide.
18. Strip lock container separately.

ORDER OF ASSEMBLING.

1. Replace carrier and carrier pin.
2. Replace action spring in slide.
3. Replace slide in receiver. (See precaution 2.)
4. Replace bolt and lock back action with bolt pin. (See precaution 3.)
5. Replace bottom plate.
6. Replace right side plate. (See precaution 4.)
7. Replace trip.
8. Replace left side plate.
9. Replace side plate screw rear.
10. Replace barrel.
11. Replace gas cylinder.
12. Replace side plate screws front.
13. Push in bolt pin letting action fly forward.
14. Replace receiver plug.
15. Replace trigger spring.
16. Replace lock container. (See precaution 5.)
17. Replace lock container screws.

PRECAUTIONS.

Be sure to lock back the action before trying to unscrew the barrel when stripping and before screwing in barrel in assembling.

Stripping

1. See that hammer is cocked.

Assembling

2. Dive tail of belt guide in proper place in receiver.
3. Rounded end of bolt pin in to left.
4. Feed lever between feed lugs.
5. Lock properly assembled.

STOPPAGES AND JAMS.

Immediate Action. If gun stops draw charging handle smartly to the rear, relay and fire. If this fails repeat the action.

If immediate action fails examine bolt in ejection opening and if necessary open observation slot cover.

I. Bolt forward and locked. Eject round and examine it.

A. Failure to prime. (Live round ejected.)
1. Misfire.
2. Defective hammer or spring.
3. Defective firing pin.
4. Defective trip.
5. Defective sear or spring.

B. Failure to feed. (No round ejected.)
1. Space in belt.
2. Defective feed lever.
3. Defective ratchet lever or pawl.
4. Defective feed wheel dog Spring.

C. Insufficient gas force. (Empty shell ejected.) Gas port clogged or gas adjuster screwed too far out.

II. Bolt Unlocked and less than half way back.

D. Battered or bulged cartridge.
E. Foreign matter in chamber.
F. Separated case. (Marks on ejected cartridge)
G. Wet or tight belt.
H. Feed jam:
1. Defective carrier or dog, or carrier dog does not function due to insufficient gas force.
2. Defective cartridge extractor.
3. Improper loading of belt. (Cartridges not even or too short).
4. Improper loading of gun.

I. Cartridge extractor and carrier locked (weak cartridge extractor spring).

III. Bolt farther than half way back.

J. Defective shell extractor. (Empty shell in chamber with live round coming up from below).
K. Defective ejector. (Empty shell in receiver with live round coming up from below).
L. Defective chamber guide. (Bullet point above chamber of barrel).

CARE AND CLEANING. B.D.A. FIRING.

General principles are the same as for the Lewis Gun.
Following points should be observed.

Before firing.

1. All working parts except face of bolt and head of piston evenly oiled.
2. Chamber dry.
3. Ammunition and belt examined.
   Ammunition defects same as Lewis
   Belt defects

   1. Dirty
   2. Wet
   3. Frayed or worn
   4. Stretched
   5. Loose pockets
   6. Bent metal tips.

4. Observation Slot Cover Shut.
5. All screws tight.
6. Gas regulator properly adjusted. (Start screwed all way in. Screw out until gun ceases to knock.)
7. Check adjustment of Bolt pin in cam slot.
8. Check adjustment of trip using trip guage. Insert between piston rod shoulder and gas cylinder block. Should trip sear on "Trip" and should hold on "no trip".

During firing on ground.

1. Do not over-heat the barrel.
2. Never fire a burst of more than 50 rounds on the ground.

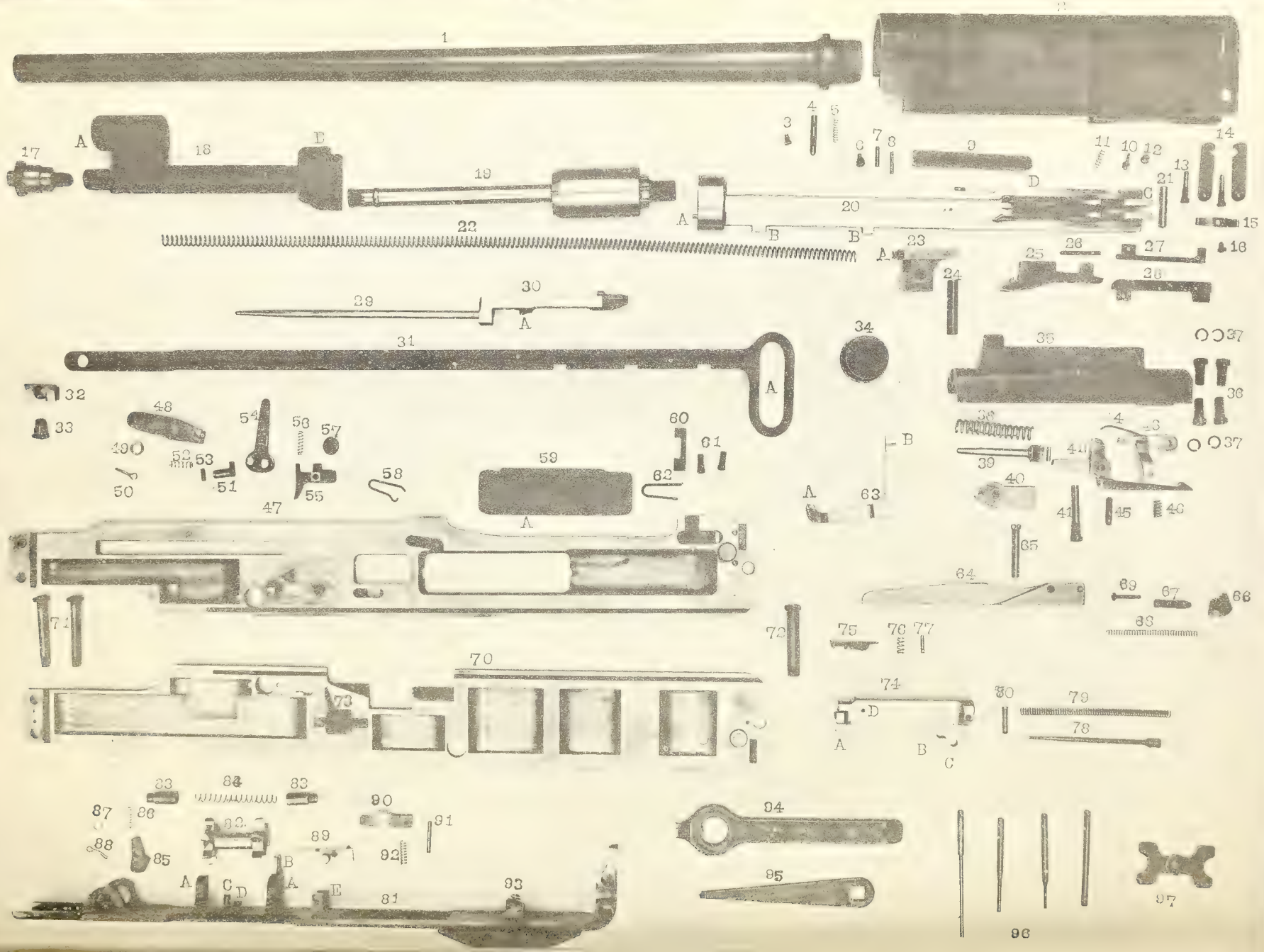
After firing.

1. Strip completely.
2. Oil all working parts.
3. Examine carefully for ---
   a. Broken extractor spring. (Shell or cartridge extractor).
   b. Burrs in cam slot.
   c. Worn or damaged firing pin.
4. Oil any replaced parts.

MARLIN GUN PARTS.

1. Barrel.
2. Receiver.
3. Barrel lock screw.
4. Barrel lock.
5. Barrel lock spring.
6. Ejector stop screw.
7. Ejector spring plunger.
8. Ejector spring.
9. Ejector.
10. Cartridge retainer plunger.
11. Cartridge retainer plunger spring.
12. Cartridge retainer plunger screw.
13. Receiver plug lock latch screws. (2)
14. Receiver plug lock latches.
15. Receiver plug lock spring catch.
16. Receiver plug lock spring catch screw.
17. Gas adjuster.
18. Gas cylinder.
    - A. Gas cylinder brackdt.
    - B. Gas cylinder block.
19. Piston rod. (Gas piston in end.)
20. Slide.
    - A. Piston rod lock pin.
    - B. Feed lugs.
    - C. Carrier cam.
    - D. Slide cam groove.
21. Bolt pin.
22. Action spring.
23. Buffer block.
    - A. Buffer block springs. (2)
24. Buffer block pin.
25. Cartridge extractor.
26. Cartridge extractor pin.
27. Cartridge guide, left.
28. Cartridge guide, right.
29. Action spring guide.
30. Belt guide.
    - A. Bullet stop.
31. Charging slide.
    - A. Charging slide handle.
32. Charging slide retaining lug.
33. Charging slide retaining lug screw.
34. Receiver plug.
35. Lock container.
36. Lock container screws.
37. Lock container screw washers.
38. Hammer spring.
39. Hammer spring guide.
40. Hammer.
41. Hammer screw.
42. Trigger.
43. Sear.
44. Sear spring.
45. Trigger and sear pin.
46. Trigger spring.
47. Right side plate.
48. Ratchet lever.
49. Ratchet lever pin washer.
50. Ratchet lever pin cotton pin.

51. Ratchet lever pawl.
52. Ratchet lever pawl spring.
53. Ratchet lever pawl pin.
54. Feed lever.
55. Feed throw off.
56. Feed throw off spring.
57. Feed throw off screw.
58. Observation slot cover spring.
59. Observation slot cover.
    A. Cover cartridge guide.
60. Charging slide guide.
61. Charging slide guide screws. (2)
62. Charging slide tension spring.
63. Trip.
    A. Trip nose.
    B. Trip arm.
64. Carrier.
65. Carrier pin.
66. Carrier dog.
67. Carrier dog plunger.
68. Carrier dog spring.
69. Carrier dog spring guide.
70. Left side plate.
71. Side plate screws front. (2)
72. Side plate screw rear.
73. Bullet guide.
74. Bolt.
    A. Front triangular fin.
    B. Rear fin.
    C. Cam slot.
    D. Gas escape hole.
75. Shell extractor.
76. Shell extractor spring.
77. Shell extractor pin.
78. Firing pin.
79. Firing pin spring.
80. Firing pin stop pin.
81. Bottom plate.
    A. Feed wheel supports front and rear.
    B. Cartridge stop.
    C. Feed wheel dog pin.
    D. Feed wheel dog spring stop pin.
    E. Cartridge extractor cam seating.
    F. Rear mounting bracket.
82. Feed wheel.
83. Feed wheel shafts. (2)
84. Feed wheel shafts spring.
85. Feed wheel dog.
86. Feed wheel dog spring.
87. Feed wheel dog pin washer.
88. Feed wheel dog pin cotton pin.
89. Belt support.
90. Cartridge extractor cam.
91. Cartridge extractor cam pin.
92. Cartridge extractor cam spring.
93. Carrier stop screw and spring.
94. Combination spanner.
95. Combination screw driver.
96. Assorted drift pins.
97. Trip gauge.


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G 506

"H" SQUADRON

A - General Description 1st hour

Purpose:- To give student knowledge of the use of the Marlin gun, the type to which it belongs, and general information about it; to give a general idea of the cycle and the important points in which it differs from the Lewis; and to familiarize the student with the names and appearance of the large and important parts.

1 - Use ----------
- Fixed gun
- Synchronized
  - Spad gear
  - C.C. gear
- Sighting
- Control of fire (Lever on control stick)

2 - Type ----------
- Gas operated
- Air cooled
- Belt fed (Advantages)

3 - General information ----------
- Barrel
  - 24" long
  - .30 caliber
  - 4 lands 1 turn in 10"
  - Grooves .004" deep
- Weight
- Rate of fire 680 per minute

4 - Cycle of gun --- Show with a dummy in the gun the functions of:-
- Cartridge extractor
- Carrier
- Bolt
- Hammer and trigger
  - Why gun can be synchronized and Lewis cannot
- Feed wheel

5 - Stripping ----------
- Nomenclature of a few of the most important parts
- Action of action spring
- Force transferred through piston and slide

G 507

H. SQUADRON

A' GENERAL DESCRIPTION. 2nd hour.

Purpose: to give student an understanding of the reasons for a certain order of stripping and assembling the gun and the precautions, and get them to start in learning the order and precautions; to give a more detailed understanding of the working of the various parts of the gun; to give all possible drill in nomenclature at same time.

1. Stripping....(discuss the order while stripping gun.
   Hammer cocked and why.
   Why action locked back before unscrewing barrel.
   Details of removing the action spring.

2. Functions of slide: (Parts of slide that perform functions)
   Operates feed.
   Extracts cartridge from bolt.
   Operates the bolt.
   Operates carrier.
   Operates trip.

3. Locking of bolt.
   Operation of bolt pin in cam slot.
   Point out the locking recess.
   Slant of rear end of bolt.
   Firing pin.

4. Ejection.....

5. Cartridge extractor.
   Cartridge extractor spring shown.
   Cartridge extractor cam.

6. Assembling Discuss order and precautions as given in Stencil.
   (Student to have stencil before him)

   Assembling order in stencil to be changed as follows:
   "Replace carrier and carrier Pin" comes first, and
   "5, Replace barrel" comes after " 12. Replace side plate screws front".

H. SQUADRON.

A". GENERAL DESCRIPTION. 3rd hour.

Purpose: to fix in the minds of the students the stripping and assembling order the reason for this order and the precautions to be observed to give a more detailed description and explanation of the working parts not covered in the previous hour; to impress in the minds of the students the names of the parts already taken up and to teach the names of all new parts taken up.

1. Stripping. Review stripping by asking questions.

2. Lock container. Use lock container model.
   Hammer, hammer spring and guide.
   Function of trigger.
   Function of sear.
   How assembled and how it may be wrongly assembled.

3. Trip .....

4. Carrier. Use block for carrier and slide
   Names of parts.
   Action of dog.
   Flanges on slide.

5. Feed mechanism detailed action of:
   Feed lever.
   Ratchet lever.
   Ratchet lever pawl.
   Construction of feed wheel.
   Feed wheel dog.
   Belt support.
   Feed throw off.

6. Assembling.
   Review assembling and precautions by asking questions.

MECHANISM OF MARLIN GUN

3rd Hour I Squadron

1. Gas cylinder.

Parts.
Gas adjuster.
Principle of operation.
Names of parts.

2. Slide and piston.

Parts.
Action spring.
Parts taking thrust of ends.
Parts guiding the center.
Functions of slide.
How each stroke is stopped.

3. Cartridge extractor.

Parts holding cartridge as extractor snaps over.
In front.
On right and left.
Above and below.
Cartridge extractor cam.
Right and left cartrdige guides.
Observation slot cover cartridge guide.
Why notched on top edge.

4. Carrier.

Carrier dog.
Cycle of operation
Exact time of each motion.
Flanges.
How motion of carrier is limited.
Function of carrier stop spring.
Inverted ramps.
Cartridge retaining plunger.
Chamber bullet guide.

MARLIN GUN MECHANISM

4th Hour I Squadron

5. Bolt

Locking and unlocking.
How locking is secured.
Shape of cam slot.
Bevel on rear end.
Cut away on sides.
Front triangular fin.
Shape of face.
Shell extractor.
Spring.
Shoulder.

6. Lock.

Names and functions of parts.
Why sear is longer than the trigger.
How it may be wrongly assembled.

7. Trip.

8. Ejector.

Action.
Parts.
How fastened in.

9. Feed mechanism.

Names of parts.
Cycle of operation.
Exact time each action happens.
How motion of feed lever is limited.
Feed throw off.
Screw.
Spring.

THE CONSTANTINESCO FIRE CONTROL TIMING GEAR.

I. Definition

1. A Fire Control Timing Gear or a Synchronising Gear is a mechamism attached to a gun so as to make its fire semi-automatic instead of automatic; that is, the trigger is tripped by the gear for each individual shot fired, the tripping of the trigger being so timed relative to the speed of the propeller as to make sure that no blade is in the line of fire at the moment the bullet passes through the plane in which the propeller revolves.

II. Description

1. The gear is made of the following units:-
   (a) The Bowden Control Assembly
   (b) The reservoir Assembly
   (c) The Generator Assembly
   (d) The Trigger Motor Assembly

2. Nomenclature

(a) The Bowden Control Assembly

1. Bowden Control Lever
2. " " Lever Bolt and Nut
3. " " Lever Bracket, Cap and Screws (2)
4. " " Wire
5. " " Wire Nipples (2)
6. " " Wire Casing (Long and short)
7. " " Wire Casing Adjuster Union, Union Nut, and Union Check Nut

(b) Reservoir Assembly

8. Reservoir Base
9. Reservoir Plunger Tube
10. " Outer Tube
11. " Outer Tube Cover and Gasket
12. " Oil Filler Tube, Cap and Chain
13. " Brazed Nut and Gasket
14. " Plunger
15. " Plunger Handle, Nut and Cotter
16. " Plunger Leather, Washer, Nut and Cotter
17. " Plunger Spring
18. " Plunger Spring Collar and Brazed Pin
19. " Plunger Spring Upper Retainer
20. High Pressure Valve Ball (9/32")
21. Reservoir Plunger Spring Lower Retainer
22. High Pressure Valve Spring
23. " " " Container and Gasket
24. Needle Valve Housing
25. " " Housing Gaskets (Large and Small)
26. " " Control Wire Connection
27. " " Control Wire Guide
28. Needle Valve
29. " " Guide
30. " " Spring, Collar and Packing

(c) Generator Assembly

31. Auxiliary Pipe
32. Auxiliary Pipe Union and Union Nut
33. Generator Pipe Union, Nut, and Lock Gasket
34. " Cylinder
35. " Plunger
36. " Sleeve
37. " Plunger Ball (1/2" dia.)

38. Generator Plunger Packing
39. " Plunger Bolt, Washer, Nut, and cotter
40. " Gear Housing
41. " Gear Housing Gasket
42. " Gear Housing Cover
43. " Gear Housing Studs, Washers, Nuts, and Cotters (6)
44. " Gear Shaft, Washer, Nut, and Cotter
45. " Cam Gear Adjuster Gear
46. " Cam Gears (2)

(d) Trigger Motor Assembly

47. Main Pipe
48. Trigger Motor Tee-piece
49. Trigger Motor Valve and Spring
50. Air-Outlet Seat and Gasket
51. Air-Outlet Valve and Lock Gasket
52. Trigger Motor Union
53. " " Union Nut and Lock Gasket
54. " " Plunger Housing
55. " " Plunger U-Leather, and Washer
56. " " Plunger
57. " " Plunger Spring
58. " " Carrier
59. " " Carrier Key
60. " " Carrier Clamp Bolt, Nut, and Cotter

A. Low Pressure Port
B. High Pressure Port
C. Opening Around Needle Valve
D. Passage Leading Out of Reservoir
E. Space behind Generator Plunger
F. Face of Trigger Motor Plunger

3. Synopsis of the C.C. Gear Action

There are two cams attached by some means to the engine of the airplane which rotates when the engine is turning over. If the cam-follower (Generator Plunger) by chance is up against the cam-way, it will be thrown back when the peak of one of the cams hit it. As there is no spring or force to drive it back, it will stay away from the cam and cam-way. There must be then some force generated to force the plunger back against the cam-way when the gear is to be operated. This is obtained by means of the Reservoir. The entire system is filled with a liquid which is under atmospheric pressure. This liquid fills the Outer-Tube and because of an opening in the bottom of this tube, the liquid is under the same pressure throughout the system, (Main and Auxiliary Pipes). If the Reservoir Plunger is pulled up, it allows the liquid to enter the Plunger-Tube and at the same time extends the Plunger Spring putting it under tension. When the Plunger Handle is released, it puts the liquid locked in the Plunger-Tube under a high pressure. If by some mechanical means the low pressure port is closed, and the high pressure port is opened, the high pressure will be immediately transmitted to the whole system. The high pressure behind the Generator Plunger forces it up against the cam, and with each rotation of the cam an impulse or wave is generated. This wave travels up the Main Pipe and impinges on the Trigger Motor Plunger which travels forward hitting the tail of the trigger and fires the gun. It has been stated that by some mechanical means the low and high pressure ports are controlled, so low or high pressure can be throughout the system. This is accomplished by the Needle Valve and High Pressure Ball Valve. When the Bowden Control Lever is pressed, the Control Wire is pulled, bringing the

Needle Valve forward against the action of the Needle Valve Spring. As the Needle Valve starts forward, it closes up the low pressure port, shutting off the low pressure. With further travel, it pushes the High Pressure Valve Ball away from its seat, thus allowing the high pressure throughout the system. When low pressure is allowed in the system again the action of the gear ceases.

4. Description of the Assemblies.

(a) Bowden Control

By means of the control lever (1) and control wire (4), the needle valve (28) and high pressure ball valve (21) are controlled, which allow either high or low pressure in the system.

(b) Reservoir

This consists of the brass tube (10) forming the low pressure reservoir and provided with the filling tube and cap (12). It is screwed into the casting which consists of the high pressure reservoir (9) and the body of the control valve. The plunger leather (16) on the rod (14) works in the high pressure reservoir or tube (9). The plunger is pulled up by the handle (15) against the action of the tension spring (17) the upper end of which is anchored to the plunger and the lower end to the bottom of the brass tube. The plunger tube is bell mounted at the top to allow the leather to be drawn clear and admit liquid contained in the outer tube or low pressure reservoir to the plunger tube or high pressure reservoir below the leather. A passage connects the bottom of the high pressure reservoir to the space behind the high pressure ball valve (21), which is held in position by the spring (22) and the plug (23). Another passage connects the low pressure reservoir through the hole (A) to the Space (C) and to the auxiliary pipe connection (D). A needle can be moved by the Bowden Control through the hole (C), which forms the low pressure valve, thus closing the passage between the low pressure reservoir and the pipe connection. A further movement of the needle will displace the high pressure ball valve and allow the liquid in the high pressure reservoir to be forced by the plunger leather through the pipe connection to the auxiliary pipe line. When the needle is first withdrawn, it allows the high pressure ball valve to close and then opens the low pressure valve by withdrawing through the hole between the pipe connection and the low pressure reservoir. The auxiliary pipe line is a copper pipe 1/16" bore and runs between the Reservoir and the Generator.

(c) Generator

This consists of an aluminum housing (40) which encloses a shaft (44), an adjuster gear (45), and two cam gears (46), and has two cylinders (34) within which are two plungers (35) screwed into it. Part of the housing forms the support for the Gasoline Power Pressure Pump used on the Liberty engine and also enclosed the eccentric and connecting rod for the pump. As this pump has nothing to do with the C.C. Timing Gear, we will not treat with it in these notes. In about the center of the housing, there is a partition which holds the shaft ball bearing. Next to this bearing on the shaft is the adjuster gear (45), which is keyed to the Shaft in two places. This gear has no cams, but does have 90 little teeth on the outer edge of its side. The two cam gears (46) are next on the shaft and have two cams each. These cam gears are free to turn on the shaft until the ninety teeth which are on each side of these gears are meshed with the adjuster gear or the cam gear placed next to it. These teeth are held meshed by a washer, nut, and cotter (44) on the end of the shaft. One end of the housing is fitted with a cover so one can get at and work on the gears with ease. At the end of the housing which is placed up against the crank-case of the engine, is a baffle plate which retains the oil that is splashed up into the housing by the revolving crank shaft of the engine. By means of a drilled

hole in the bottom of the partition, the oil fills both parts of the housing to a depth of about three-quarters of an inch. This is our only means of lubrication on the cam gears and generator plungers. Screwed into the housing and offset by the width of a cam gear are the two generator cylinders (34) in which run the two generator plungers (35).

(b) Trigger Motor

This consists of the plunger (56) packed by a U packing (55) and working in a housing (54) against the action of a strong spiral spring (57) of round section. The forward stroke is limited by means of a collar on the Plunger (56). The tail of the plunger is held against valve seat (F) in the Tee-piece (48) at the back of the trigger motor. The Tee-piece contains the trigger motor valve and spring (49). The trigger motor is attached to the Marlin gun by means of a carrier (58) which fits into the opening in the receiver into which the receiver plug of the gun fits. The latches can be closed and are held securely by a clamp bolt (60). Running into the Tee-piece of the trigger motor is the main pipe which is a copper tube one quarter of an inch in diameter.

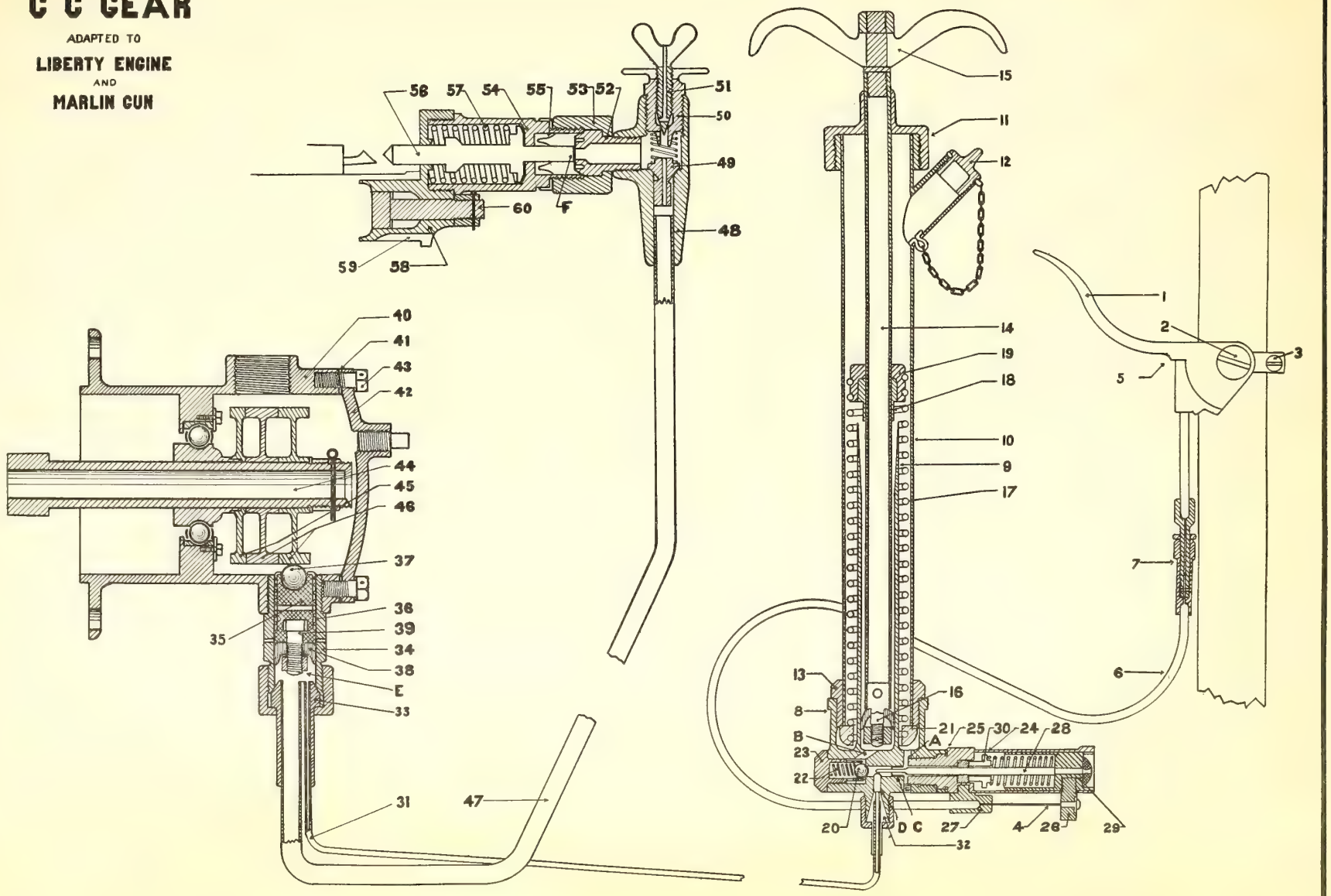
C C GEAR

ADAPTED TO

LIBERTY ENGINE

AND

MARLIN GUN



APPENDIX K4

Contains the following:

Copies of Syllabi of AIRPLANES DEPARTMENT

Furnished to Cadets on:

Theory of Flight (Airplane Principles) (2 pages)
Aeronautical Terms (Nomenclature) (3 pages)
Airplane Sketch for use in Nomenclature (1 page)
Instructors Notes on Rigging (Not issued to cadets) (16 pages)
Stresses and Materials in Airplane Construction (14 pages)
Laboratory Notes on Wing Patching (2 pages)
Meteorology (9 pages)
Instruments (6 pages)

SCHOOL OF MILITARY AERONAUTICS--BERKELEY

SYLLABUS--THEORY OF FLIGHT

A. Properties of air

B. Resistance to motion through air

I. Pressure
II. Friction
III. Variation with velocity and area of body
a. Inclined flat surfaces
b. Inclined curved surfaces
c. Aerofoils or wings

IV. Lift and drag

C. Factors contributing to lift.

I. Area of surface
II. Angle of incidence
III. Velocity
IV. Density of the air

D. The Lift-Drag ratio.

I. Factors affecting it.

a. Profile or cross section of wing
b. Plan form
c. Angle of incidence
d. Interference
e. Dihedral

E. Characteristics of Airplanes.

I. Lifting capacity
II. Drag
III. Power required to fly
Iv. Power available

F. Performances of Airplanes.

I. Maximum and minimum speed.
II. Gliding angle
III. Climbing

G. Stability and Control

I. Forces acting on an airplane in flight.

Instruction-Airplanes

II. Stability

- a. Directional stability
  - 1. Keel surface
- b. Longitudinal stability
  - 1. Longitudinal dihedral
- c. Lateral stability
  - 1. Lateral dihedral
  - 2. Sweepback

III. Control

- a. Rudder
- b. Elevators
- c. Ailerons

IV. Turning & Banking

APPENDIX

UNITED STATES
SCHOOL OF MILITARY AERONAUTICS
University of California
Berkeley, California

Airplanes Dept.

Aeronautical Terms.

Aerofoil

Aileron

Airplane

Altimeter

Angle, critical

Angle, gliding

Angle, lateral dihedral

Angle of Incidence, Riggers

Angle of Incidence, Common

Angle, Optimum

Aspect Ratio

Axis, longitudinal

Axis, transverse or lateral

Axis, vertical

Bank

Beams, wing

Biplane

Body

Butt of wing

Cabane

Camber

Center Section

Chord

Chord Length

Cock pits, front, rear

Control wires

Cowling

Decalage

Distance-piece

Drag

Droop

Edge, leading (entering, cutting)

Edge, trailing

Elevator

Empennage

Engine bed

Engine section

Fairing

Fairlead

Fin

Flying position

Fuselage

Gap

Glide

Helicopter

Horizontal stabilizer

Horns

Landing gear

Landing Gear struts, wires, spreaders

Landing gear skid

Leading edge

Lift

Lift-Drag ratio

Longeron

Nacelle

Ornithopter

Overhang- flying wires -struts

Propeller

Propeller pitch

Propeller race

Propeller slip

Pusher

Raking

Resistance, structural

Shock absorbers

Retreat

Rib, box

Rib, camber (wing, ordinary)

Rib, compression

Rib, false

Right and left hand of airplane

Rudder

Rudder post

Slide - slip

Skid

Span

Spar, wing

Speed, air

Speed ground

Spreader

Stagger

Stall

Streamline flow

Streamline shape

Strut

Stringer

Sweepback

Tail

Tail skid

Tip of wing

Tractor

Vertical stabilizer

Wash-in

Wash-out

Wing

horizontal stabilizer

landing gear struts, wires, spreaders

propeller

propeller pitch

rudder (wing, ordinary)

Wing, skid

Wires,

Balance

Cross-bracing

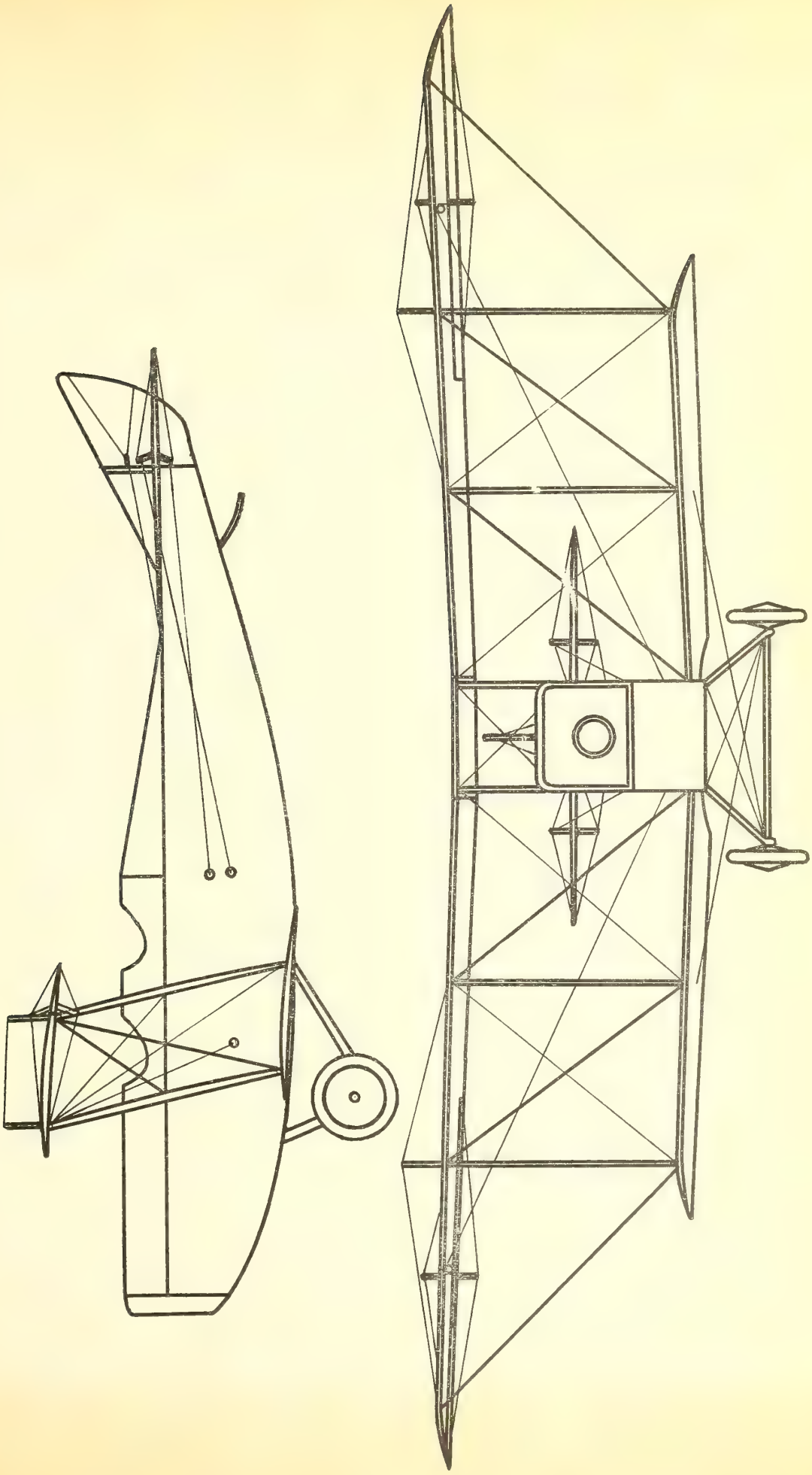
Drift & anti-drift

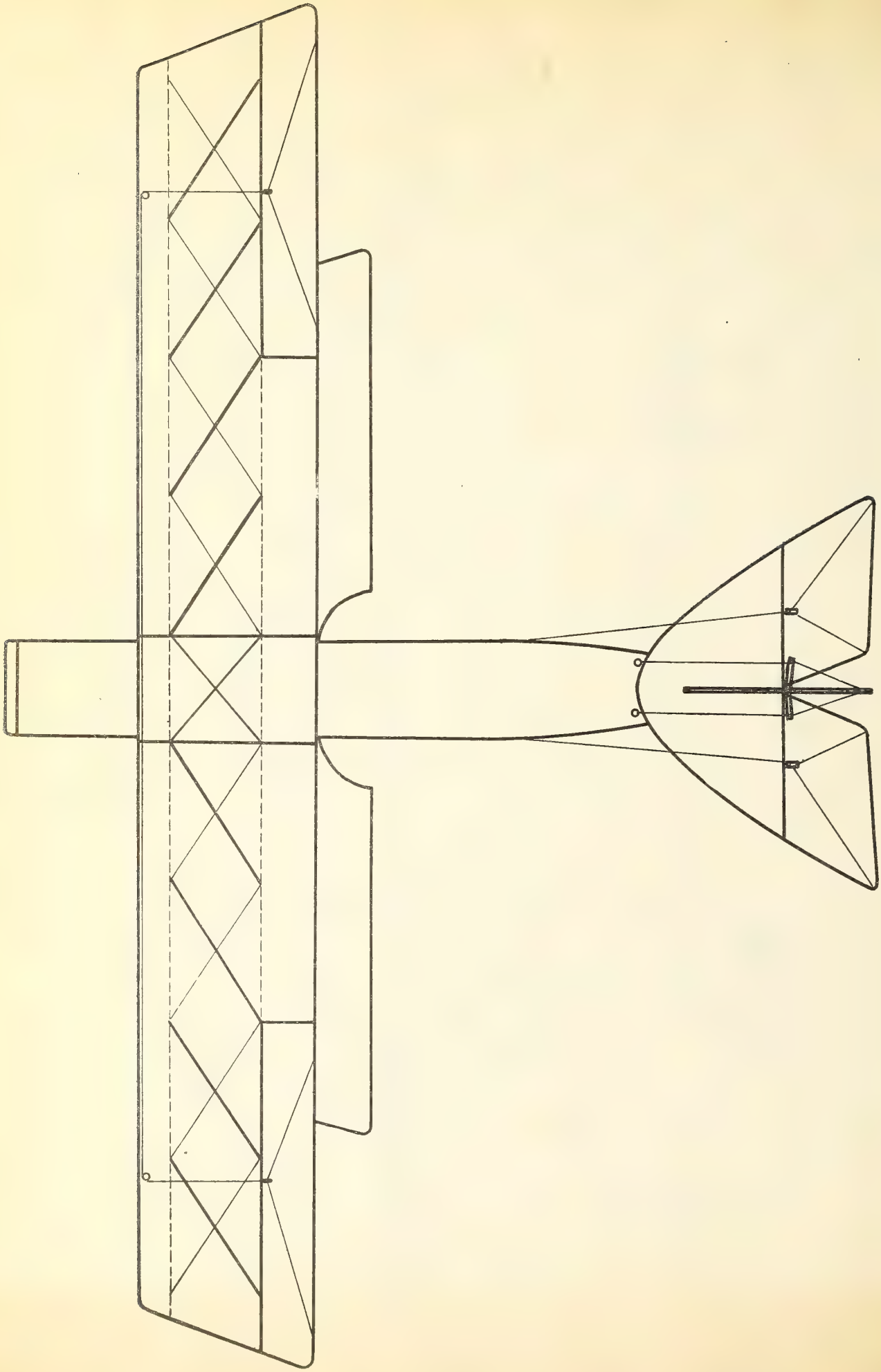
Flying

Landing

Stagger







Appendix------

UNITED STATES ARMY
SCHOOL OF MILITARY AERONAUTICS
University of California
Berkeley, Calif.

Airplanes Department.

INSTRUCTORS NOTES.

LABORATORY WORK IN RIGGING.

1. Introductory lecture, outline of work in department.

2. Names of parts to be taken up, before Disassembly.

3. List of tools used for adjustments.

4. Distribution of time in adjustments.

5. Disassembly.

6. Landing gear.

7. Center section.

8. Wings, Dihedral angle, droop stagger.

9. Stabilizers and Controls.

RIGGING - INSTRUCTORS NOTES

Introductory Lecture.

The first twenty minutes is given to an introductory lecture on the department. The work of the coming twelve weeks is outlined as in the following list, a copy of which is distributed to each student. This also contains a list of the terms to be taken up in nomenclature. Notes and the Signal Corps Training Manual are distributed at this time also.

The section will then be divided into groups and assigned to airplanes in charge of an instructor. Not more than 6 or 8 cadets will be assigned to one machine. The instructor then explains the fundamental parts of the machine as outlined in the small list following, pointing them out on the machine, and giving time for students to take notes of names on the printed sketches distributed for this purpose.

If time allows, the instructor will point out parts on the landing gear used in that adjustment and explain somewhat how the adjustment is made, in order that the cadet may visualize the parts when the adjustment is explained.

The cadets then disassemble the machine under the direction of the instructor, following the order given in the notes on disassembly following.

RIGGING - INTRODUCTORY LECTURE.

OUTLINE OF WORK - AIRPLANES DEPARTMENT.

Subjects	Hours
Theory of Flight	6
Meteorology	3
Rigging	26
Repair of Machines	12
Instruments	4
Types of Machines	2
Semi-final examinations	2
Final Examination	2 Total 57 hours.

The work in rigging includes both lectures and laboratory work and is divided as follows:

Rigging Work.

	Squadron	Hours
Introductory lecture	A	½
Disassembly of airplaines	A	1½
Nomenclature, lecture and lab.	B	2
Landing gear, (½ hr. lecture)	B	2
Center Section (½ hr. lecture)	C	2
Elementary treatment of stresses	C	1
Materials, woods and metals.	C	1
Wires and fittings	C	1
Fabrics and Dopes	D	1
Dihedral Angle (1 hr. lecture)	D	4
Semi-final Examination	D	1
Stabilizers, controls (1 hr. lecture)	E	4
Fuselage alingment (lecture)	E	1
Faults in rigging (lecture)	F	1
Functions of Parts (lecture)	F	1
Propeller (lecture)	FX	1
Soldering, brazing, welding	G	1
Propeller (lecture and Lab.)	G	1

Repair of Machines

Inspections of airplanes (lect.)	FX	1
Inspection of planes (laboratory)	FX	1
Types of Splices (lecture)	G	1
Splicing, soldering, laboratory	G	3
Semi-final examination	H	1
Wing covering and patching, lecture	I	1
Care of machines (lecture)	I	1
Wing patching laboratory	K	2
Wood splicing, (lecture)	L	1
Review	L	1

Note:- All work is continuous for time indicated, except that laboratory lecture and laboratory work are sometimes split by noon hour, etc.

RIGGING - INSTRUCTOR'S NOTES

LIST FOR INTRODUCTORY NOMENCLATURE

Types of Airplane - Example, Curtiss tractor type biplane model JN4-D. Training plane, equipped with Curtiss OX. 90HP. motor.

Right and left of airplane.

Names of parts.

Fuselage
Longerons
Vertical and transverse struts (spreaders)
Fuselage cross bracing wires.
Engine section
Engine bearers
Cock pits, front, rear.
Cowling

Landing gear, landing gear struts, landing gear wires, spreaders.
Shock absorbers.

Center section

Wings, upper and lower.
Butt and tip
Wing skid
Leading and trailing edge.
Spars or beams.
Ribs, compression, box, camber, false.
Stringers or distance pieces.
Struts, Inner, Intermediate and outer.
Drift and antidrift wires.
Landing and flying wires.
Stagger wires.
Stagger.
Overhang- overhang flying wires - overhang struts.
Cabane-Cabane wires (over hand support wires)
Stick or wheel and Post, or wheel & Bridge, yoke, foot bar or foot pedals.
Control wires, rudder, elevator, aileron.
Aileron.
Aileron balance wire.
Horn, aileron, rudder, elevator.
Tail, Empennage.
Horizontal stabilizer.
Vertical stabilizer, or fin.
Rudder post, tail post.
Rudder
Elevator
Tail Skid
Fairlead
Fairing

Note:- After explaining all the parts on the machine, the instructor goes over the wing frame construction on a stripped wing frame.

RIGGING TOOL LIST.

A - Disassembly

2 Small B.P. hammers
2 " Screwdrivers.
1 large
4 Crescent wrenches 6"
Turnbuckle twisters; for the Curtis Machine 12 large; for the Martin 8 medium and 8 small.

B - Landing Gear

2 Steel tapes
1 Plumb bob.
1 Steel scale.
1 Level
6 Turnbuckle twisters; large.

C - Center Section

2 Steel tapes
2 Crescent wrenches 6"
2 Plumb bobs.
1 Level
2 Steel scales.
1 Small screwdriver.
2 Straight pins.
2 Parallel blocks.
Turnbuckles twisters; for Curtiss machine 8 large and for Martin 4 large and 4 small.

D - Dihedral

4 Crescent wrenches 6"
1 Small screwdriver.
1 Drift pin.
2 Small B.P. hammers.
4 Plumb bobs.
1 Level
2 Steel tapes.
2 Steel scales.
4 Wooden blocks $\frac{3}{4}$ in. thick. (Martin only)
Turnbuckles twisters; for Curtiss machine 12 large, for Martin 4 large and 4 small.

E - Controls.

1 Small B. P. hammer.
2 Steel tapes.
1 Pr. Combination pliers.
2 Pieces safety wire.
4 Crescent wrenches.
1 Small screwdriver.
Turnbuckle twisters; for Curtiss 6 large and 2 medium, and for Martin 8 medium

1 small "
2 " screwdrivers.

for the Martin 6 medium and 6 small.

1 steel anvil.
1 level
6 hammocks; bright; large.

2 Iron jobs.
2 steel pliers.

1 pressed tweezers
1 small screwdriver
1 " " hammer.
1 pr. Combination pliers.
2 round files.
1 3/4 " B. F. hammer.

Hammocks brighter; for Martin 6 large and 2 medium, and for Martin 6 m.

RIGGING.

DISTRIBUTION OF TIME.
to be adhered to as closely as possible.
Corrected to October 15, 1918.

A WEEK

		Min.	Time
	Disassembly (2 hours)		A^h : 10' - A^h : 25'
	Lecture	15	A : 25 - B : 00
	Nomenclature	35	B : 00 - B : 05
	Get Tools	5	B : 05 - B : 55
	Disassembly	50	B : 55 - C : 00
	Questions etc.	5	
		1^h 50^m	
B	Landing Gear (2hours)		
	Lecture	35	A : 10 - A : 45
	Get Tools	5	A : 45 - A : 50
	1st Method	25	A : 50 - B : 15
	2nd Method	25	B : 15 - B : 40
	Return Tools	5	B : 40 - B : 45
	Questions, etc.	15	B : 45 - C : 00
	(Visit other machines)		
C	Center Section (2 hours)		
	Lecture	30	A : 10 - A : 40
	Get Tools	5	A : 40 - A : 45
	1st Method	30	A : 45 - B : 15
	2nd Method	30	B : 15 - B : 45
	Return Tools	5	B : 45 - B : 50
	Answer Questions	10	B : 50 - C : 00
D	Dihedral angle (Wings) (4 hours)		
	Lecture	50	A^h : 10 - B : 00
	Recess	10	B : 00 - B : 10
	Get Tools	5	B : 10 - B : 15
	Straightening wing		B : 15 - C : 15
	Rear beams sighted in		C : 15 - C : 45
	Droop	15	C : 45 - D : 00
	Stagger	30	D : 00 - D : 30
	Overhang	15	D : 30 - D : 45
	Return Tools	5	D : 45 - D : 50
	Questions	10	D : 50 - E : 00

DISTRIBUTION OF

E Stabilizers and Overall checks (2 hours)

Stabilizer lecture	30 min.	A : 10	to A : 40
Alignment Stabilizers	40 min.	A : 40	to B : 20
Finish by sighting in both vert. and horiz. stabilizers to check fuselage.			
Overall measurements	10 min.	B : 20	to B : 30
Angle Incidence	20 min.	B : 30	to B : 50
Safety Wiring	10 min.	B : 50	to C : 00

E Controls and Sketching (2 hours.)

Controls lecture	30 min.	A : 10	to A : 40
Alignment of Controls	35 in.	A : 40	to B : 15
Trying out controls individually	15 min.	B : 15	toB : 30
Sketching Controls	30 min.	B : 30	to C : 00

E_1 gets stabilizer work Wednesday and Controls Friday.

E_2 gets Controls work Wednesday and Stabilizer Friday.

F - X Inspection Lab. (1 hour)

Lecture	10 min.	A : 10	to A : 20
Inspection	40 min.	A : 10	to B : 00

RIGGING - INSTRUCTOR'S NOTES

A - DISASSEMBLY

a) Explain first to the students the general steps of disassembly, namely, wings, center section stabilizers, tail controls, and landing gear. Emphasize that all wires are loosened a little by turnbuckles to make disassembly of parts practical, but wires are not disconnected by unscrewing turnbuckle barrels. All bolts and clevis pins are put back into place in the main member as soon as the struts or other small parts are removed, and all nuts and washers put back in place.

Disconnect all flying or drift wires attaching the wings to the fuselage, and any other wires from the landing gear or fuselage to the wings. Also disconnect the aileron control wires where they attach near the fuselage and disconnect the aileron balance wire.

Loosen turnbuckles on the wires, including stagger, incidence, landing and flying wires about two turns. This allows the wings to be taken down easily without binding of the fittings or strains to the wings. In the Martin machines, it is essential to loosen up the center longitudinal brace wires to keep from straining the fittings when the wings are removed.

Prop up one wing by a horse under the outer strut fitting to keep the machine from tipping over after the other wing is removed.

Lift up on the other wing, having students lift at tip hand hole, at butt, and under strutt fittings. Never allow them to lift directly at trailing edge. Disconnect landing wires, attaching wing to center section. Remove bolts or butt fittings pins, first at top, then at bottom, and remove wing. Turn over on leading edges, and support by holding up on struts till blocks are put under leading edges of wings. Remove other wings.

Take one wing apart, putting all pins back into wing fittings, and all bolts back into place on wing.

Remove ailerons, putting pins back into wing fittings, Leave all struts upright, and keep them from getting nicked or damaged in handling. Place wings in racks for the purpose.

Disconnect front brace wires, stagger and incidence wires on center section, and place all pins under front wing shield. Remove wing section. Remove center section struts on planes where bolts are convenient to get at. Place bolts back in center section and fuselage fittings.

Loosen rudder and elevator control wire turnbuckles. Disconnect control wires at horns, and remove rudder and elevators. Unbolt and remove vertical and horizontal stabilizers, putting all bolts nuts, pins, and washers back in place, either on stabilizer or fuselage. Unbolt and remove tail skid where accessible.
Loosen the brace wires of the landing gear, but do not disconnect the landing gear.

Loosen the brace wires of the landing gear but do not disconnect them.

Disconnect front brace wires, stagger and incidence wires at center section. Remove center section panel and remove vertical and horizontal members. Unscrew all bolts and remove wires, and washers once in place, either on machine or loosely.

Loosen rudder and elevator control wire turnbuckles. Disconnect fittings.

Remove other one, putting one door into each fitting. Screw and all bolts back into place on wing.

Take one wing apart, putting all nuts back into wing fitting as before, and remove wing. Turn over on to work bench to remove other wing, and remove fittings. Never allow wing to contact with rough or abrupt surface. Never allow wing to contact with rough or abrupt surface. Never allow wing to contact with rough or abrupt surface

B - RIGGING. Landing Gear.

1- Cross Distance Method.

(a) Let maching be supported by the wheels, or block up under the shock absorbers, and do not level up the machine, as in this adjustment we wish to approximate field conditions.
(b) Have all wires in the landing gear loose, except the front cross brace wires, and they may be made as nearly as possible the same length by sighting the amount of shank covered by the barrels.
(c) Measure front cross brace wires and adjust till of same length and proper tension.
(d) Tighten rear cross brace wires to the proper tension, being sure that both are at the same tension.
(e) Measure rear cross brace wires, if unequal, the fittings are off. In the field, if the cause of the error were not known, the difference would be distributed between the front and rear wires. If time allows, this is done on the machine. Do not try to pull wires same length regardless of tension.
(f) Tighten up any other auxiliary bracing wires to proper tension.
(g) Turnbuckles are then usually safety wired, as landing gear will not have to be changed for the other adjustments. (we do not safety wire in the laboratory as it takes too much time and is not an essential part of any one adjustment. It is covered later).

2- Plumb Bob Method.

(a) Machine must be supported under the fuselage by horses inthis adjustment, in order that the level of the fuselage will not be destroyed as the landing gear may be moved in adjusting. All horses must be placed directly under a vertical strut or under the nose of the machine.
(b) Level up machine approximately longitudinally, and exactly laterally. Use engine bearers or longerons if engine bearer are known to be wraped or inaccessible because of engine.
(c) Measure laterally across under side of fuselage, above axle, and find the center of the under side of the fuselage. (Over spreader if possible. (Somewhere on the longitudinal axis of fuselage). Use longerons as points of reference in measuring to center.
(d) Find center of axle, or center of spreader if axle has side play, measuring from similar points on each side.
(e) Those central points should both be checked by measuring from one side to the supposed center, and then measuring from the other side in to the same point and having the measurements agree.
(f) Drop plumb bob from center of under side of fuselage, with enough string to let the bob just clear the axle. (Sometimes it is necessary to suspend the bob from a stick which rests on the lower longerons if there is no part of the fuselage available as a means of support for the string.) (Lining and plumbing with mark on spreader by eye.)
(g) Adjust front cross brace wires until center of the axle is directly under the plumb bob. (all other wires loose and machine level laterally.)
(h) Tighten rear cross brace wires to equal and proper tension, seeing that the center of the axle stays directly under the plumb bob. (watch the level).
(i) Tighten all additional brace wires to proper tension.
(j) Turnbuckles would now be safely wired in actual practice (see 1-g)

B - RADIUS

1- Chord Distance Method-

(k) If fittings were off on cross measurement method, lengths of wires can now be checked to see where the error is located. The unequal lengths necessary for correct adjustment would then be entered in the log book kept for that machine.

C- RIGGING CENTER SECTION

I- Cross Distance Method. Do not level machine.

(A) Place and bolt center section struts in their proper position and connect up all brace wires that go to the center section.
(B) Make longitudinal adjustment first (easier if done first in the Curtiss Machine) by making use of some set measurement from the log book which measurement was found after the machine had been lined up properly by the level and plumb bob method. This measurement is usually a measurement of the length of some wire from clevis pin to clevis pin, or diagonally across the side of the center section struts from bolt to bolt in the strut fittings. Stagger and Incidence wires are to be at the proper tension when this measurement is taken.
(C) Lateral adjustment is made by hanging the front across brace wires the same length and proper tension. If any change is made laterally it may affect longitudinal adjustment, so recheck longitudinal adjustment after lateral adjustment is finished. Do not safety wires, as wings must be on and adjusted before turnbuckles of center section are safety wired.

2- Level and Plumb-Bob Method.

(a) If time allows loosen up front cross brace wires, stagger, and Incidence wires, to emphasize the face that it is a separate method of adjustment and not just a check on the cross distance method. Otherwise this can be explained and the method used to check and made any necessary corrections on the previous adjustment.
(b) Level machine laterally and longitudinally, on the engine bearers if possible, otherwise on the upper longerons, at or as near the engine as practical. Check the level by reversing it.
(c) Drop a plumb from each front corner of the center section, putting a common pin diagonally into the corner so that the string is in line with both the leading edge and the butt of the center section. This saves moving the plumb bob for the two adjustments. In the case of the Curtiss machines, the pins will be put in the corners of two small blocks of equal thickness which are flush with the leading edge of the center section, and rest against the butts of the center will not influence the adjustment.
(Note) For the sake of uniformity, on account of the Curtiss machines, the longitudinal adjustment will be made first.
(d) Measure the distance on a lower wing butt (which is not in place on the machine) from the inner edge of the front flange of the butt fitting, or center of bolt hole on the Martin type, to the cutting edge measuring parallel to the chord of the wing. This distance corresponds to the distance from the outer edge of the front flange or fuselage, or center of bolt hole of the fuselage fitting, to the leading edge of the wing when in place.
(e) Lay the board along the butt fitting on each side of the fuselage, marking on it the distance from the fitting to the leading edge of the wing, which has

just been measured. Add to this the amount of stagger which is measured horizontally if there is any, and make a vertical mark on the board where theplumb bob should hang.
(f) See that the plumb bob hangs freely, and if it touches the board, swing it laterally to eliminate friction. Adjust the stagger and incidence wires on each side till they are at the correct tension and plumb bob line coincides with the mark on the board, indicating the correct stagger. In the case of the Curtiss machines the stagger and the front cross brace wires are identical, so the turnbuckles of these should be kept as balanced as possible by eye during the adjustment.
(g) For the lateral adjustment on the Martin machine, tighten the front cross brace wire to tension (on the Crutiss they are already tight). See that the plumb lines have straight and at equal distances from the lower longerons. Check distance to both upper and lower longerons to see if fuselage is twisted. Adjust front cross brace wires till these distances are equall. If the fuselage is twisted take the mean of the measurements from the plumb lines to the upper and lower longerons for this purpose.
(h) Recheck the longitudinal adjustment. In the case of the Crutiss, any large change in the lateral adjustment will probably cause a slight change in the former on account of the double functioning of the wires in front as front cross brace and stagger wires.
(i) Check the level from time to time, and particularly after the adjustment is finished.
(j) Safety wiring is not done until the wings are on and lined up properly.

RIGGING - INSTRUCTOR'S NOTES.

D- KLEIN - WINGS, DIHEDRAL, DROP AND STAGGER.

A) Assemble the wing that is apart. See that all strut bolts point toward the pilot, so that he can see that they are safe as he looks from the cockpit. Other bolts and clevis pins should either face toward the ground or to the rear so that gravity or wind pressure would hole one in if the the nut or outer key should come off.
b) Attach one wing to the fuselage, attaching landing wires and tightening them enough to support the wing. Block under beams under outer struts to keep machine from tipping over until the other wing is attahced.
c) Attach other wing. Be sure all landing wires are connected and tight enough to hold wing before it is left unsupported.
d) Cover and balance the threads on all landing wire turnbuckles throughout wings, and take about two additional turns in each turnbuckle to bring wings to a proximate position before straightening out. Have all other wires connected, but the only wires with any tension are the landing wires. All flying, stagger and incidence wires should be loose and left loose until purposely tightened.
e) Locate the central point of the center section on the cutting edge, and two other points, one in each upper wing cutting edge, within a couple of inches either side of the outer struts, so that these two points are equi-distant from the outt fittings of the wings, and in the center of the cutting edge of the wings, and also so placed that if the wings were straight, these three points would form a straight line, Put tacks at each of these three points. (if not already there)
f) See if each wing is straight by sighting from the tip to ards the butt under the cutting edge of the lower wing. Straighten by adjusting the landing wires.
g) Measure out similar distances from the butts of the wings to the lower ends of the front outer struts in each wing. (there is usually a punch mark on strutt fitting about 1/8" up from bottom of fitting. See that wings are symetrically placed in regard to fuselage and center section by measuring diagonally from the tack in the center of the center section to these points. The longer diagonal represents the lower wing.
h) If wings are not symetrical, find out whether one is to be raised or the other lowered, by stretching a string taut by means of weights at the ends, over the two tacks already located near the tips of the wings. Measure up to this string from the top of the tack in the center section. This measurement to the string tells whether the dihedral angle is too large or too small. The dimensions used for the distance out on the wing and the consequent perpendicular distance from the center depend upon the particular machine and the dihedral angle desired, and are given in the log book of the machine. Remember the wings will be pulled down when the flying wires are tightened. So they should be placed higher now than it is desired to have them when machine is properly rigged. The amount of this sag depends upon the machine.
i) Keep trailing edge approximately parallel to cutting edge during alignment of cutting edge, so that when trailing edge is aligned it will not destroy the alignment of the cutting edge.

the nut or outer

ound or to the

from the cockpit.

a point toward

ing them

j) When wings are straight, symetrical, and up enough so that proper dihedral will result, t en tighth flying wire over front be m to proper and equal tension on both wings, getting cutting e ge into proper position. Check and correct straightness, right and left symmetry, a proper dihedral.

k) After leading edge is properly ali ed, sight in trailing edge in each wing by standing in front near butt of the wing and getting the eye in line withthe cutting and trailing edges at the same time near the butt. Do not move the head but sight out toward the tips. If more of the trailing edge is near the tips, the trailing e ge should be raised, an vice versa. After getting straight with the landing wires, tighten each landing ire four or five turns to al ow for the stretch of the wires after the flying ires are tightened. Tighten down the flying wires and check settling of wing. If not straight, straighten out by adjusting flying and landing wires. Remember that the angle of incidence at the butt is the correct angle for the entire wing.

l) Droop is put into the left wing of each of the machines in the laboratory. Washout is not put in the other wing because all are under 150 HP. In actual field rigging, this droop would be put in as the trailing edge is straightened out For instruction purposes, the men are divided into t sections, one to each wing. Each section straightens out their own wing. hen both wings are straight, droop is put in the left wing by both sections working together.

The droop is obtained by lengthening the landing wires of the rear beam of the left wing and tightening the flying wires to proper tension. The landing wires of the outer bay should be lengthened the most (usually about 3/8") with lesser amounts on the intermediate and inner bays, giving most of the droop at the tip, where it is most effective, and decreasing progressively towards the butt. This is usually sighted by the eye to obtain the proper amount ($\frac{3}{8}$" on the machine in the lab.) This droop may be checked by holding a rule under the cutting edge near the center of the left wing. Standing opposeite the butt of the wing and the same distance from the rule at the cutting edge, the rule is from the trailing edge, line in the leading and trailing edge at the butt. The 3/8" division of the rule should now just line in with the trailing edge at the tip, if the droop is correct.

m) After wings are properly aligned for straightness, symmetry, dihedral and droop, the stagger is measured along the entire span by putting the machine in flying position, leveling exactly longitudinally, and drop ing plumb bobs over leading edge of upper wing at strut points. Be sure stagger horizontally (unless otherwise specified) from lower cutting edge to string. The stagger is measured along the entire span ~~by putting the machine in flying position, leveling~~ to see how the upper wing must be moved in relation to the lower wing to give the proper stagger. The upper wing may have to be moved forward, backward or one tip forward, the other tip backward. This adjusting is done entirely at the center section. Stagger and incidence wires through the wings are not used, as their use would wash in or wash out the wings as well as affect stagger. If the adjustment is at all large, it will be necessary to loosen up the flying wires through the wings so that they will not hold the center section so rigid that it can not be pulled around into position. If the landing wires are not touched, the flying wires can be tightened down again without changing the adjustment seriously. If wings can not be straightened up, it may be due to internal alignment of the wings. This can be partially checked by sighting along the

leading edges of the wings.
n) When the stagger is correct, recheck all previous adjustments and then tighten stagger and incidence wires to proper tension, being careful not to pull wings out of alignment.
o) Straighten up overhang by sighting in from tip ends cutting edge for front beam, and sighting from leading edge to get trailing edge straight as near as may be with lower wing. Overhang wires should not be as tight as other wire through the wings.
p) Safety-wire all turnbuckles through the wings. (Do not safety-wire in the laboratory, as not enough time is allowed, and safety wiring is demonstrated under controls.)

RIGGING - INSTRUCTOR'S NOTES.

E - WEEK CONTROLS

(a) Attach the tail skid, the horizontal and vertical stabilizers, and all controlling surfaces that belong on the tail of the fuselage. Be sure that all control wires are connected.

(b) Adjust the tail skid first by making the two brace wires that run to the horizontal stabilizer equal in length, and at the proper tension.

(c) The vertical stabilizer is adjusted next. In the Curtiss machines the horizontal stabilizer is not adjustable, except by changing the length of the struts holding it, or by readjusting the fuselage; so the vertical stabilizer may be adjusted to be perpendicular to the horizontal stabilizer by having the vertical stabilizer brace wires equal in length and the proper tension. The vertical stabilizer must also be in line with the center of the center section, as sighted by eye.

In the Martin machines the fore part of the horizontal stabilizer is fixed rigidly by struts, so the vertical stabilizer may be adjusted to be perpendicular to the horizontal stabilizer, by means of the short pair of brace wires to the front part of the horizontal stabilizer. These wires are made the same length and the proper tension, but do not get these wires too tight, as unnecessary tension on these wires will pull the rudder post forward and out of line. The vertical stabilizer must also be in line with the center of the center section, as sighted by eye.

(d) The horizontal stabilizer is now adjusted in the case of the Martin machine. (On the Curtiss machines the horizontal stabilizer can not be adjusted without changing the length of the struts, or readjusting the fuselages.) In the Martin the cutting edge is fixed by struts, so the trailing edge of the horizontal stabilizer is aligned by sighting along the trailing edge of the horizontal stabilizer and keeping it straight, and having the four rear wires from the horizontal stabilizer to the rudder post at the same and proper tension and each two wires of a given pair equal in length. The two upper and two lower.

(e) The rudder is aligned by having the rudder a continuation of the vertical stabilizer and both the rudder and vertical stabilizer must line in the longitudinal axis of the machine. This is determined by sighting them with the center of the center section. When rudder is in this position, (neutral) the rudder bar should be in neutral, or perpendicular to the longitudinal axis of the fuselage. If foot pedals are used, they should be in their neutral position which would be in the center of their arc of motion, and at the same distance forward. Control wires should be as tight as possible without any binding.

(f) Elevators are aligned by having the under surfaces of the elevators a continuation of the under surface of the horizontal stabilizer, as told by sighting At the same time sight along the trailing edges of the two elevators, and see if they form a straight line, the two trailing edges must form a straight line. This adjustment is obtained with control (either stick or Dep. type) in neutral position i.e. perpendicular to the longitudinal axis of the machine, or in the

center of its arc of motion. The elevators are aligned as continuation of the horizontal stabilizer, because the horizontal stabilizer is not ordinarily a lifting surface, and no lift will be on either the horizontal stabilizer or elevators with the machine is in the normal flying position. Have wire as tight as possible without binding.

(g) The ailerons, if wing flap, are aligned below the trailing edge of the wing to which they are attached, as when in the air, wing flap ailerons become lifting surfaces, and the control wires to which they are attached will stretch enough to allow the ailerons to rise above the trailing edge of the wing. In these machines have ailerons about ½" below the trailing edge of the wings when all wires are tight and the machine on the ground. Adjust balance wire first to have the ailerons only a little below the trailing edge of the wing, but have each droop the same amount. Then with stick perpendicular to the lateral axis of the machine or with wheel so that the point of attachment of aileron control wires is at the top of the pully to which they are attached, (in either case the neutral position for that control) tighten the control wires evenly and pull the ailerons down until they have the requisite droop of ½" when all wires are as tight as possible with out binding.

Interplane ailerons are aligned parallel to the air stream, or parallel to the longerons in the case of the Martin machines, as no lift should be on them when the machine is in its normal flying position. Note (These machines flew tail heavy, so the ailerons were drooped 4" to make them fly correctly.) Have all wires as tight as possible without binding.

(h) After all controls are aligned, have each cadet try the controls and learn the instinctive movements required for any desired action of the machines.

(i) Show the different systems of safety wiring on standard and Martin turnbuckles. Standard type turnbuckles are sometimes safety wired by wrapping the safety wire around the turnbuckle not more than one turn in such a direction as will tend to tighten the turnbuckle, but the straight system of safety wiring is according to Government specifications. Here the wire is passed through the hole in the barrel and run straight to the eye in the wire attached, or the clevis end of the turnbuckle, where the safety wire is looped thru, and going diagonally across the end of the eye or the shank, to keep it from binding between loop and eye of shank, and wrapped from 3 to 4 times around the shank of the turnbuckle.

In the Martin ½ type the wire is started through the eye in the shank and looped through each barrel so that each loop form a figure 8, one wire is now returned through eye of shank and the two ends of the safety wire twists together about 5 turns or more.

(j) Have each cadet make 3 sketches to show all control systems. Be sure these sketches are correct before the cadet is allowed to leave.

UNITED STATES ARMY
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

AIRPLANES DEPARTMENT

STRESSES AND MATERIALS IN AIRPLANE CONSTRUCTION.

I. Stresses

II. Woods and Metals

III. Wires and Fittings

IV. Fabrics and Dopes.

Rigging - Stresses.

STRESSES IN MATERIALS USED IN AIRPLANE CONSTRUCTION.

A. Stress and Strain.

I. General ideas of each.

B. Tension

I. General idea.

II. Tensile strength

a. Resistance to tension deformation.

III. Metal tension members.

a. Wires.

IV. Wood as tension member.

a. Longitudinal shear of fittings.

C. Compression

I. Stress due to pressure.

II. Compressive strength.

a. Resistance to compressive deformation.

III. Size necessary to reduce bending.

a. Wood good compression member - struts.

b. Struts usually fail by bending.

1. L/r ratio usually much greater than 45.

IV. Crushing strength across grain, -wood.

a. Varies directly with density of wood.

D. Bending.

I. Strain caused by bending.

II. Stresses of bending.

a. Tension where pulled apart.

b. Compression where pressed together.

c. Neutral Axis.

1. Distribution of compression and tension.

Rigging - Stresses

d. Flexural Strength in bending.

1. Outside fibers.

e. Channeling out beams - "I" -Beams.

1. Wooden beams.

a'. Danger of longitudinal shear.

2. Steel beams.

E. Shear.

I. General idea of shear.

a. Longitudinal.

1. Wood--beam, tension member.

b. Traverse

1. Metals, wood.

II. Shearing strength and area.

III. Shear in clevis pins and bolts.

F. Torsion.

I. General idea of torsion.

II. Circular shaft and outside area.

a. Removing core.

G. Combinations of stresses.

I. Shear and Bending.

a. Worn clevis pin.

II. Compression and Bending.

a. Importance of outside fiber.

b. Strut.

H. Strength per Unit of Area.

I. Tables of breaking strength.

a. Variation with type of stress.

II. Materials never loaded to breaking point.

Rigging - Stresses.

a. Factor of Safety.

b. Safety factors of airplane members.

I. Comparison of strengths of woods and metals, per unit of weight.

I. Actual strength of woods and light metals less, but weight much less.

II. Table of Strengths per sq. in. per unit of Spec. Grav.

TABLE OF COMPARATIVE STRENGTHS OF WOODS AND METALS
(Woods with 5% moisture).

Material	Strength in lbs. per sq. in.			Spec. Grav.	Strength per unit of Specific Gravity.		
	Tension	Compression	Shear		Tension	Compression	Shear
Alloy Steel (tempered)	220,000	220,000	180,000	8.0	27,500	27,500	22,500
Tool Steel (tempered)	180,000	--- ---	--- ---	8.0	22,500	-- ---	-- ---
Spruce	10,000	8,500	700-	0.49	21,000	17,400	1,410
Ash (heavy)	15,000	8,500	2,500	0.72	21,000	11,800	3,500
Hickory	15,000	11,000	1,800	0.85	17,600	12,900	2,100
Aluminum (Copper alloyed)	40,000	-- ---	-- ---	2.7	14,800	-- ---	-- ---
Tobin Bronze	100,000	120,000	-- ---	8.5	11,700	14,100	-- ---
Open Hearth Steel (Annealed)	90,000	90,000	75,000	8.0	11,200	11,200	9,400
Cold Rolled Steel	80,000	80,000	60,000	8.0	10,000	10,000	7,500
Aluminum (cast)	10,400	16,000	9,000	2.6	4,000	6,200	3,500
Cast Iron	14,600	96,000	5,200	7.2	2,020	13,400	720

Rigging - Materials.

MATERIALS USED IN AIRPLANE CONSTRUCTION

A. Metals

I. Steel

a. Temper and annealing.

1. Method of accomplishing each.

2. Advantages of tempering.

3. Disadvantages of tempering.

b. Open Hearth Steel.

1. Good grade of purified steel.

2. May be used tempered or annealed.

3. Uses - forged fittings, etc.

c. Alloy steels

1. Effect of alloy.

2. Chromium, Nickel, and Vanadium commonly used.

3. Principal uses.

d. Cold Rolled Steel (c.r.s.)

1. Method of manufacture.

a'. Appearance and defects.

2. Advantages of use.

3. Disadvantages.

4. Principal uses.

II. Aluminum

a. Advantages for airplane use.

b. Disadvantages.

c. Never used where strength is essential feature.

d. Uses.

e. Aluminum Alloys.

1. General increase in strength.

2. Unreliability.

Rigging - Materials.

III. Copper and Tin.

a. Qualities.

b. Uses.

IV. Brass.

a. Alloy of Copper and Zinc.

b. Qualities.

c. Uses.

V. Bronze.

a. Alloy of Copper, Zinc and Tin.

b. Variations of characteristics with composition.

c. General Qualities.

d. Uses.

VI. Monel Metal.

a. Alloy of Nickel, Copper, and Iron.

b. Qualities.

c. Uses.

B. Woods.

I. General Properties.

a. Remarkable strength per unit of weight.

1. See Tables of Comparative Strengths per unit of Spec. Grav.

2. Variations of weight.

b. Factors affecting strength.

1. Amount of moisture.

(Moisture weakens up to point of fiber saturation only).

2. Process of drying.

1'. Air seasoning.

2'. Kiln drying - case hardening, etc.

Rigging - Materials.

3. Original Position in tree.

4. Defects

1'. Grain

2'. Other defects.

II. Species of Woods.

a. Spruce

1. General advantages.

1'. Best strength per unit of weight if properly handled.

2. Disadvantages.

3. Uses - Most generally used wood.

b. Ash.

1. General characteristics.

2. Used as longerons, engine bearers, etc.

c. Maple

1. General characteristics.

2. Great reliability for small parts.

3. Used as rib cap blocks and in propellers.

d. Cedar.

1. General characteristics.

2. Uses as veneer board.

3. Port Orford Cedar.

e. Hickory.

1. General characteristics.

2. Used for foot bars, tail skids, etc.

f. Walnut and Mahogony.

1. Qualities - strength.

2. Used principally for propellers.

Rigging - Materials.

g. Hard Pine.

1. Advantages.

2. Used slightly for long longerons.

III. Protection of Wooden Parts.

a. Necessity of transparent covering.

1. Spar varnish.

Rigging - Wires and Fittings.

WIRES AND FITTINGS USED IN AIRPLANE CONSTRUCTION.

A. Wires.

I. Uses of wires (tension members only).

II. Material of wires.

a. Always high grade steel.

1. Untempered or partially tempered.

2. Alloyed and tempered steel.

1'. Advantages of temper.

2'. Disadvantages of temper.

III. Protection of wires from moisture.

a. Advantages of tinning over galvanizing.

b. External wires sometimes greased.

IV. Types of wires.

a. Solid Aviator Wire.

b. Stranded Aviator Wire.

c. Aviator Cord.

d. Flexible Cable.

V. Advantages and disadvantages of strand and cord over solid wire.

B. Turnbuckles.

I. Use and need of turnbuckles.

a. Operation, (right hand thread one end and left hand thread on other.)

II. Made of non corrosive materials.

a. Standard Turnbuckles

1. Bronze Barrel in middle.

2. Steel shank at both ends.

3. Both barrel and shank sometimes heavily coppered.

Rigging - Wires and Fittings.

b. Martin Type Turnbuckles.

1. Bronze barrels at each end.

2. Steel shank in middle threaded at both ends.

3. Advantages in attaching wires and fittings.

a. Barrel and Clevis.

b. Barrel and Socket Splice.

III. Precautions and protection.

a. Threads entirely covered.

b. Safety wiring.

c. Graphite or vaseline greased.

C. Clevices and Clevis Pins.

I. Uses of clevices.

a. Fastenings for wires.

b. Hinge pins.

II. Stresses in clevis pin.

a. Shear

b. Bending caused by poor fit or wear.

III. Materials of which made.

a. Clevis of good grade open-hearth steel, often tempered.

b. Pins, hard alloyed tempered steel.

D. Fittings.

I. Wing fittings

a. Butt fittings

1. Bolted or large clevis fittings

2. Transmit wing forces to fuselage and center section.

b. Strut fittings.

1. Transmit forces from wing beams to struts and wires.

2. Fastenings for wires and struts.

Rigging - Wires and Fittings.

c. Materials

1. Cold rolled steel, stamped and cut by machine.

2. Open hearth steel, drop forged.

1'. Often tempered.

II. Protection of fittings against moisture.

a. Internal.

b. External.

III. Precautions.

a. Bent or rusty fittings or bolts.

b. Accidental heating.

E. Splices in wires.

I. Necessity for splices for fastening wires.

II. Types of splices.

a. Solid wire.

1. American Splice.

2. French Splice.

b. Stranded wire.

1. Running Splice.- Thimble.

2. Socket Splice.

c. Cord or Flexible Cable.

1. Eye splice - Thimble.

F. Vibration and Fatigue.

I. Description of effect of vibration on steels.

a. Vibration excessive around engine.

b. Vibration very light over most of plane.

II. Effect of fatigue on steels.

a. Can not be eliminated in some parts such as crank shaft.

b. Fatigue unnecessary in airplane proper and should be eliminated by proper design.

Rigging - Fabrics and Dopes.

FABRICS, DOPES AND VARNISH.

A. Fabrics.

I. Qualities desired in an ideal covering.

a. Strength and weight.

b. Application as covering.

c. Atmosphere

d. Durability

e. Finish

f. Other desirable features.

II. Qualities of unbleached linen.

a. Strength and weight.

b. Application.

c. Durability.

d. Finish.

e. Bleaching.

f. Coloring Matter.

g. Cost and Supply.

III. Qualities of Cotton.

a. Strength and weight.

b. Application.

c. Durability.

d. Finish.

e. Cost and Supply.

IV. Experimental Coverings.

a. Silk.

1. Strength and weight.

2. Application.

b. Canvas Duck (Twilled Cotton).

1. Strength and weight.

Rigging - Febrics and Dope.

c. Rubberized Silk or Linen.

1. Strength and weight.

2. Durability.

3. Atmosphere.

B. Dope.

I. Cellulose Veneer.

a. General appearance.

b. Cellulose Acetate.

1. Resistance to fire.

2. Durability.

c. Cellulose Nitrate.

1. Inflamability.

2. Durability.

3. Difficulties of applying.

II. Manufacture.

a. Complicated Process.

1. Cost.

b. Outline of Process of Manufacture of Acetate Dope.

III. Functions of Dope.

a. Coverings.

1. Shring covering.

2. Strength.

3. Finish.

4. Durability.

5. Atmosphere.

b. Splices.

1. Shrink Wrapping.

2. Finish.

Rigging - Fabrics and Dopes.

IV. Transparent Coverings.

a. Uses.

b. Materials.

c. Characteristics.

d. Possibilities.

C. Varnish.

I. Kind Used.

a. How obtained.

II. Purposes of Varnish.

a. Wing covering.

b. Wood.

1. Danger of poor varnish.

D. Application of Dopes and Varnish to Fabrics.

I. Dope

a. Effect of atmospheric conditions.

b. How applied.

II. Varnish.

a. How applied, and how effective.

III. Comparative weights of Dope and Varnish on finished plane.

UNITED STATES
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
Berkeley, Calif.

AIRPLANES DEPARTMENT.

Laboratory notes on Wing Patching.

A. Triangular Tear.

1. Cut a rectangular patch extending about 1½" beyond every point of the tear.
2. Fray the edges about 3/16 of an inch in.
3. Trim the edges of the tear if they are very ragged.
4. Thread a needle with linen thread, wax it and sew up the tear using the baseball stitch.
5. Sew from each end toward the center, tie both threads at the center, and push the knot inside the tear.
6. Apply some dope, over a surface a little larger than the patch, to soften old varnish. Wait till it softens.
7. Scrape off the varnish.
8. Apply a coat of dope over the cleaned surface.
9. Apply a generous coat of dope over the under side of the patch.
10. Stick it in place using fingers to smooth out the air bubbles and wrinkles. Make sure to stick down the frayed edges.
11. Apply a coat of dope over the surface and let it dry.

B. Repair over a rib.

1. Prepare patch as above.
2. Remove rib strip far enough back, on each side of the tear to accommodate the patch and cut if off.
3. Sew up tear from both ends toward the rib and tie both threads together at one side of the rib.
4. Remove varnish as above.
5. Stick down patch as above.
6. Stick piece of rib strip in line with the old one overlapping same about 1½ inches on both ends.
7. Apply a coat of dope over the patches.

C. To repair a puncture.

1. It is not necessary to sew up the hole.
2. The rest is the same as the above repairs.

Laboratory notes on Wing Patching (Cont.)

Notes.

1. To remove varnish use Adelite, Acetone, Dope or some other varnish remover.
2. Do not allow any of the liquids applied to drop through the tear. It will soften the surface on the other side and make it rough.
3. When white spots or streaks are noticed on the surface of the repair apply carefully one of the solvents, Ether, Acetone, or Banana oil. These can also be used to thin down the dope.
4. To facilitate the drying of the dope in damp and cold weather add some Ether.
5. After the patch is put on a wing apply 4 to 7 coats of dope at about 1/2 hour intervals, allowing the last coat to dry about 24 hours. Then apply a coat or two of Spar Varnish.
6. Place patch parallel to the edge of the surface.
7. Use patch as near the color of covering as possible.
8. Round the corners if time does not permit to fray the edges of the patch.

METEOROLOGY.

In meteorology as related to Aviation we are interested in two somewhat different branches of the science. First, in the process of weather forecasting, which has to do with the conditions as they are at the surface of the earth. Forecasting may be with or without the use of weather maps, the last is of more direct importance to the aviator. Second, the conditions of the atmosphere affecting aviation. This treats of the winds above the surface of the earth, their direction and velocity, of cloud heights, and conditions generally at altitudes to which an airplane may fly.

Outline.

The Atmosphere.
- Height of the atmosphere.
- Composition of the atmosphere in as much as it related to aviation.

- Pressure of the atmosphere.
  - Distribution of the earth's atmosphere, and the corresponding pressure distribution.
  - The mercurial barometer, construction, errors, and use.
  - Reduction to sea level.

- Heat, in its relation to meteorology.
  - Importance of "convection".
  - The vertical temperature gradient.

Cloud Forms.
- Classification: upper, middle, and lower layers.
- Heap clouds.
- Importance of clouds to aviators.

Winds in general.
- Winds are due to pressure differences.
  - Definition of "Isobar".
- The Barometric Gradient.
- The Planetary and Terrestial winds.

Cyclonic features.
- Cyclones and anticyclones: definitions, and general characteristics of motion and size.
- Wind circulations about high and low pressure areas in the two hemispheres.
- Distribution of climatic elements about a typical cyclone, and anticyclone.
- The nature of the "Secondary", the "V" depression, and the "Wedge".
- The Tornado.
- Line Squalls and Thunderstorms.

Forecasting.
- The weather map: construction and use.
- Prodiction of the motion of passing weather features
- The normal weather.

Boy's Ballot's Law.
Means of predicting the weather, using the barometer, wind direction, and clouds, by observations made at the place of the observer only.

Conditions of the atmosphere affecting aviation.
The "bumps" or "holes in the air" are the result of irregular air currents. Regions of decidedly diminished density do not exist in free air, except as the result of some sudden and violent effect, such as an explosion, for instance.
These irregular air currents may be classified, for simplicity, into three groups; convection-caused, wind layer, and surface friction.
Clouds may give warning as to the existence of the currents, if there are clouds where the currents happen to be.

Effect of surface friction on the lower layer of wind. Friction will have an observable effect up to a height of about 1500 ft. on the average over land, but much less over water areas.
The "Gradient Wind" and its prediction.
Nature of the usual veering of the wind to be expected within the first few thousand feet above the surface.
Wind motions above the height at which the gradient velocity is reached. The higher one goes within the maximum flying height the greater is the probability that the wind will be from the west. When the lower wind comes from the east, the upper wind is apt to be uncertain.

Means of obtaining information regarding these upper air currents.

As a general rule, anticyclonic, or high pressure conditions, are the most favorable for flying.

Cloud Sheets

Upper cloud layer about 30,000 feet Clouds composed of ice crystals. With these are sometimes seen halos, or rings, at some distance (22° or 46°) from the sun and moon.

Cirrus. Mares tails, wisps or line of pure white clouds with no shadows.

Cirro-Cumulus. Small speckles and flocks of white Clouds, mackerel sky.

Cirro-Stratus, A thin sheet of tangled web structure sometimes covering the whole sky: watery sun or moon.

Cirro-Nebula. Similar to the last, but a veil of cloud with no visible structure.

Middle cloud layer: 10,000 feet to 25,000 feet. Clouds composed of minute crops of water. Colored rings sometimes seen quite close to sun and moon but never halos.

Alto-Cumulus. Somewhat similar to cirro-cumulus, but the cloud masses are larger, and show more shadow.

Alto-Cumulus Castellatus. Turret-cloud; alto cumulus with upper margins of the cloud massed developed upwards into miniature cumulus, with hard upper edges. (Sign of thunder.)

Alto-Stratus. Very like cirro stratus and cirro nebula, but thicker and darker cloud.

Strato-Cumulus. Cloud masses with some vertical structure: rolls or waves sometimes covering the whole sky.

Lower cloud layer. Below 7,000 feet.

Stratus. A uniform layer of cloud resembling a fog, but not resting on the ground.

Numbus. Shapeless cloud without structure, from which falls continuous rain.

Scud. Small shapeless clouds with ragged edges: sometimes seen without other cloud, especially in hilly country, but more commonly seen below other clouds, such as cumulus and nimbus.

Heap Clouds.

Cumulus (wool pack clouds). Cloud with flat base and considerable vertical height. Cauliflower shaped top.

Fac
Facto Cumulus. Small cumulus with ragged tops.

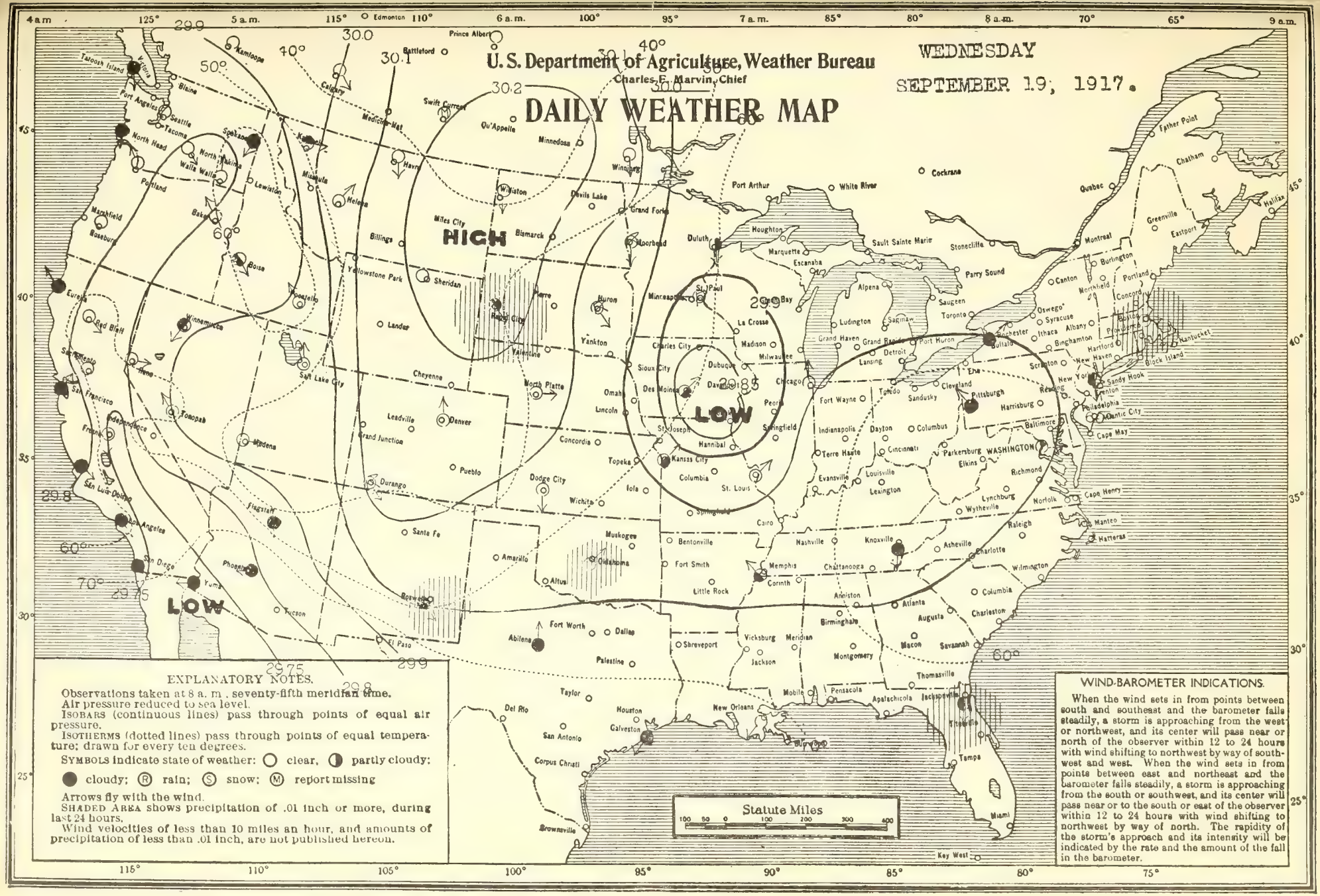
Cumulo Nimbus. (Anvil-Thunder or shower cloud). Towering cumulus with top brushed out in soft wisps or larger masses (false cirrus) and rail cloud at the base.

The height of the heap clouds is very variable. The mean height of the base is about 4,000 feet. The height of the top varies from 6,000 to 25,000 feet.

BEAUFORT SCALE OF WIND FORCE.

General description.	Specifications of Scale.	Beaufort number.	Statute m.p.h.
Calm	Calm; smoke rises vertically.	0	Less than 1.
Light air	Direction of wind shown by smoke drift, but not by wind vanes.	1	1 - 3
Slight breeze	Wind felt on face; leaves rustle: ordinary vane moved by wind.	2	4 - 7
Gentle breeze	Leaves and small twigs in constant motion: wind extends light flag.	3	8 -12
Moderate breeze	Raises dust and loose paper; small branches are moved.	4	13--18
Fresh breeze	Small trees in leaf begin to sway: crested wavelets begin to form on inland waters.	5	19 -24
Strong breeze	Large branches in motion. Whistling heard in telegraph wires; umbrellas used with difficulty.	6	25 -31
High Wind	Whole trees in motion: inconvenience felt when walking against the wind.	7	32 -38
Gale.	Breaks twigs off trees: generally impedes progress.	8	39 -46
Strong gale	Slight structural damage occurs. (Chimney pots and slates removed).	9	47 -54
Whole gale	Seldom experienced inland trees uprooted: considerable structural damage occurs.	10	55 -63
Storm	Very rarely experienced, accompanied by widespread damage.	11	64 -75
Hurricane	.....	12	Above 75


U. S. Department of Agriculture, Weather Bureau
Charles F. Marvin, Chief
DAILY WEATHER MAP
TUESDAY
SEPTEMBER 18, 1917.
HIGH
LOW
HIGH
LOW
Statute Miles
EXPLANATORY NOTES.
Observations taken at 8 a. m., seventy-fifth meridian time.
Air pressure reduced to sea level.
ISOBARS (continuous lines) pass through points of equal air pressure.
ISOTHERMS (dotted lines) pass through points of equal temperature; drawn for every ten degrees.
SYMBOLS indicate state of weather: clear; partly cloudy; cloudy; (R) rain; (S) snow; (M) report missing.
Arrows fly with the wind.
SHADED AREA shows precipitation of .01 inch or more, during last 24 hours.
Wind velocities of less than 10 miles an hour, and amounts of precipitation of less than .01 inch, are not published hereon.
WIND-BAROMETER INDICATIONS.
When the wind sets in from points between south and southeast and the barometer falls steadily, a storm is approaching from the west or northwest, and its center will pass near or north of the observer within 12 to 24 hours with wind shifting to northwest by way of southwest and west. When the wind sets in from points between east and northeast and the barometer falls steadily, a storm is approaching from the south or southwest, and its center will pass near or to the south or east of the observer within 12 to 24 hours with wind shifting to northwest by way of north. The rapidity of the storm's approach and its intensity will be indicated by the rate and the amount of the fall in the barometer.


U. S. Department of Agriculture, Weather Bureau
Charles F. Marvin, Chief
DAILY WEATHER MAP
WEDNESDAY
SEPTEMBER 19, 1917.
HIGH
LOW
LOW
WASHINGTON
Statute Miles
100 50 0 100 200 300 400
EXPLANATORY NOTES.
Observations taken at 8 a. m., seventy-fifth meridian time.
Air pressure reduced to sea level.
ISOBARS (continuous lines) pass through points of equal air pressure.
ISOTHERMS (dotted lines) pass through points of equal temperature; drawn for every ten degrees.
SYMBOLS indicate state of weather: ○ clear, ◑ partly cloudy; ● cloudy; Ⓡ rain; Ⓢ snow; Ⓜ report missing
Arrows fly with the wind.
SHADED AREA shows precipitation of .01 inch or more, during last 24 hours.
Wind velocities of less than 10 miles an hour, and amounts of precipitation of less than .01 inch, are not published hereon.
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When the wind sets in from points between south and southeast and the barometer falls steadily, a storm is approaching from the west or northwest, and its center will pass near or north of the observer within 12 to 24 hours with wind shifting to northwest by way of southwest and west. When the wind sets in from points between east and northeast and the barometer falls steadily, a storm is approaching from the south or southwest, and its center will pass near or to the south or east of the observer within 12 to 24 hours with wind shifting to northwest by way of north. The rapidity of the storm's approach and its intensity will be indicated by the rate and the amount of the fall in the barometer.

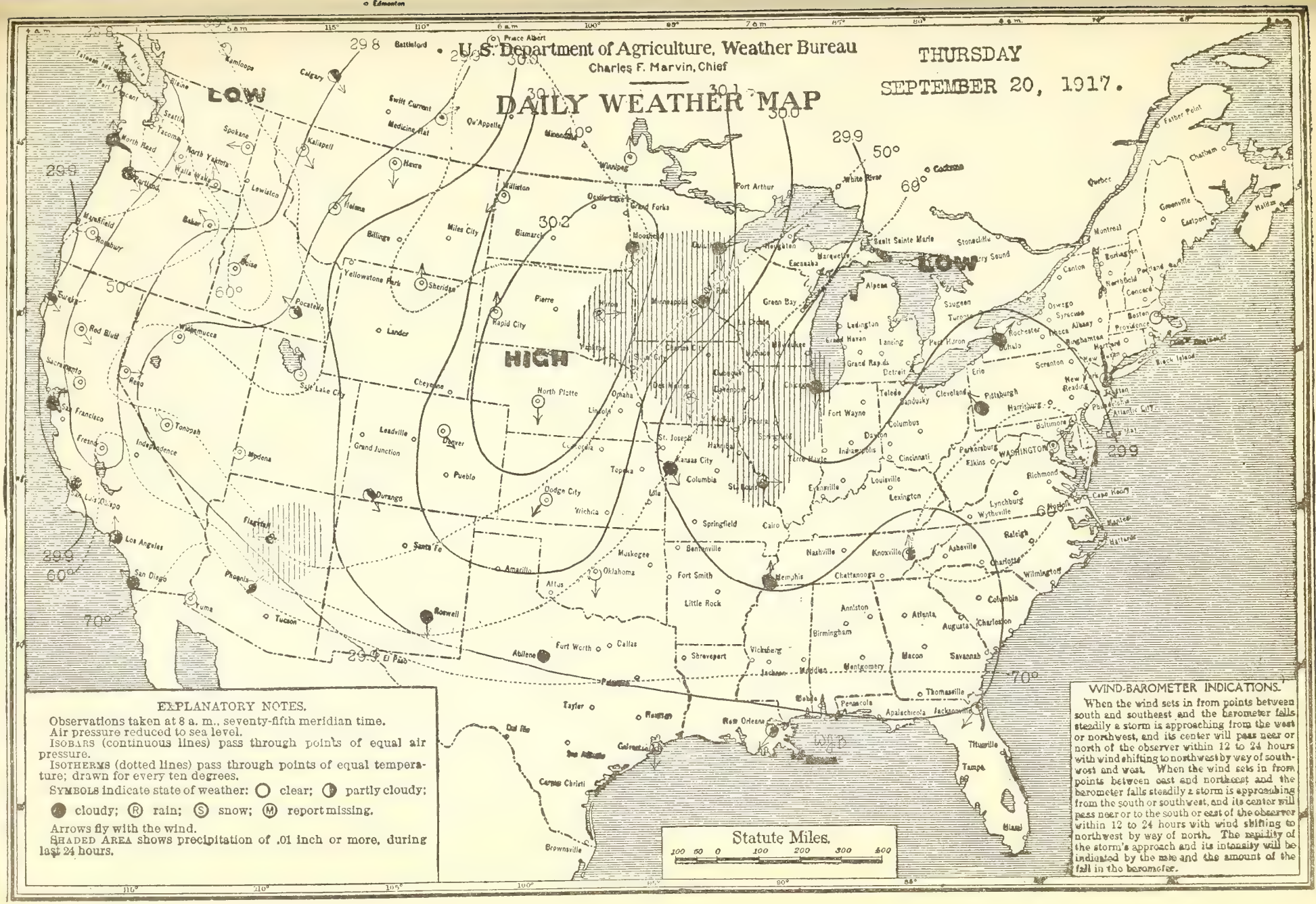

U.S. Department of Agriculture, Weather Bureau
Charles F. Marvin, Chief
DAILY WEATHER MAP
THURSDAY
SEPTEMBER 20, 1917.
LOW
HIGH
LOW
EXPLANATORY NOTES.
Observations taken at 8 a. m., seventy-fifth meridian time.
Air pressure reduced to sea level.
ISOBARS (continuous lines) pass through points of equal air pressure.
ISOTHERMS (dotted lines) pass through points of equal temperature; drawn for every ten degrees.
SYMBOLS indicate state of weather: clear; partly cloudy; cloudy; (R) rain; (S) snow; (M) report missing.
Arrows fly with the wind.
SHADED AREA shows precipitation of .01 inch or more, during last 24 hours.
Statute Miles.
100 50 0 100 200 300 400
WIND-BAROMETER INDICATIONS.
When the wind sets in from points between south and southeast and the barometer falls steadily a storm is approaching from the west or northwest, and its center will pass near or north of the observer within 12 to 24 hours with wind shifting to northwest by way of southwest and west. When the wind sets in from points between east and northeast and the barometer falls steadily a storm is approaching from the south or southwest, and its center will pass near or to the south or east of the observer within 12 to 24 hours with wind shifting to northwest by way of north. The rapidity of the storm's approach and its intensity will be indicated by the rate and the amount of the fall in the barometer.



FIG. 1 —CIRRUS

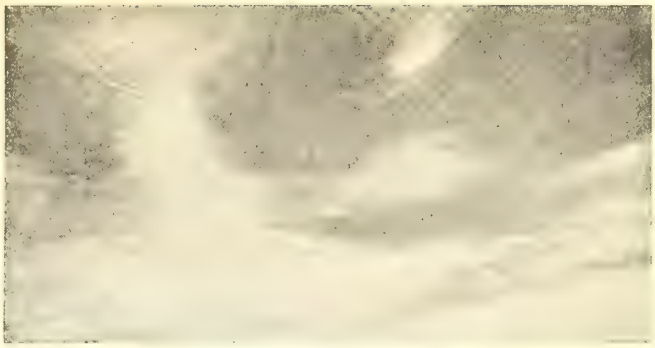


FIG 2 —CIRRO-STRATUS

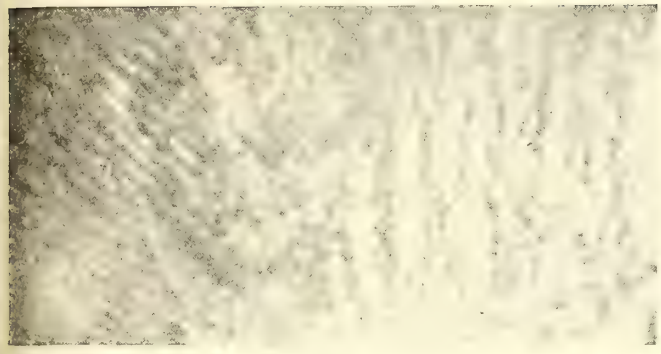


FIG. 3 —CIRRO-CUMULUS.



FIG. 4.—ALTO-CUMULUS



FIG. 5.—ALTO-STRATUS

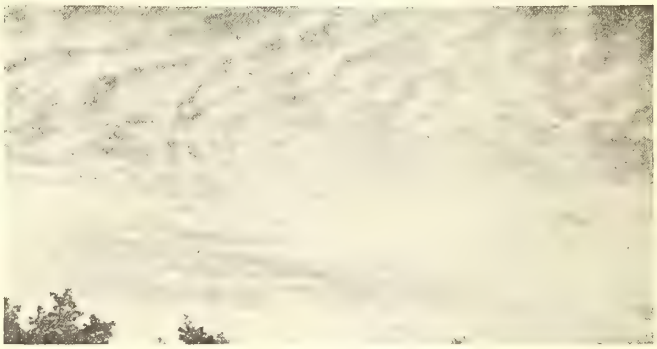


FIG 6 —STRATO-CUMULUS.

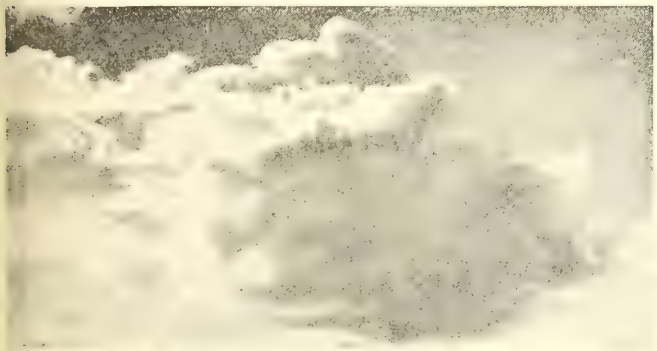


FIG. 7.—CUMULUS.



FIG. 8 —STRATUS.



FIG. 9. —NIMBUS

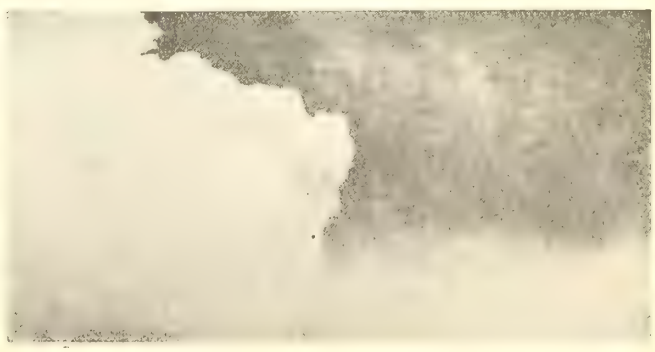


FIG. 10.—CUMULO-NIMBUS.

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THE ELEMENTS AT WAR: WHERE THE RECENT BAD WEATHER ORIGINATED

We owe much to the south-west winds, but they bring us those cyclonic disturbances which make our climate, though the healthiest in the world, such an uncertain quantity. Cyclones originate far out in the Atlantic and they almost invariably travel in a north-easterly direction, revolving spirally and counter-clockwise, with very marked characteristics in different portions of their whirling mass of cloud, wind and rain, as particularised above. Often 2000 miles in diameter, they may take several days to pass over our islands—if we are in the track of the vortex—and crossing over north-west Europe they are finally exhausted and dispersed in northern latitudes. The diagram makes clear why during a cyclone the wind at a given spot can blow successively from every point of the compass.

[Reproduced by permission of the *Graphic*]

Instruments.

The instruments used upon airplanes may be divided into three different classes. First, those used in ordinary flight. Second, the instruments occasionally used, for calibration, or for tests. Lastly, the meteorological instruments which do not have to do directly with airplanes.

Those instruments discussed here will be those of the first two types, the meteorological instruments will be dealt with elsewhere.

Outline.

Instruments commonly used:

1. The Aneroid Barometer, used for indicating elevations.
   - Construction: vacuum pans, lever system, dial.
   - The errors to which the instrument is liable; their importance.

2. The Air Speed Indicator.
   - Construction and principle of operation of the various types.
     - Pitot Tube.
     - Pressure Plate.
     - Venturi Tube.
     - Anemometer, of the whirling cup variety.
   - Effects of density changes on the various instruments, their operation at high altitudes, and the distinction between a pure "speed indicator" and a "stall indicator".

3. The Inclinometers, both fore and aft, and transverse, usually of the curved spirit tube type.

4. The watch, and the map board.

5. The Compass.
   - Construction.
     - The card, bowl, lubber line, and suspension of the bowl.
     - The use of a liquid in the compass bowl.
   - The Variation.
   - The Deviation.
   - The placing of the compass on an airplane: the various conditions which should be fulfilled.
   - Compass adjustment, and how it is done.
   - The cause and effect of the compass errors due to the turning and tipping of the machine, and those due to vibrations.
   - Practical management of the compass: how it may be made to read geographic directions instead of magnetic ones.
     - Movable Lubber's Line.

6. The construction of the "Drift Indicator".

Gauges having to do with the engine:

7. The Tachometer, or Revolution Counter.
   - Construction, and relative advantages of the various types.
     - Centrifugal, Magnetic, etc.

8. Radiator Thermometer.

9. Gasoline Gauge, for quantity in the tank.

10. Air and Oil pressure gauges, of the ordinary form.

Of the second class may be mentioned the following:

11. Barograph, or Recording Aneroid.

12. Thermometers and Thermographs.

13. Rise and fall meters.

14. The Angle of Incidence Indicator.

15. Flow meter.

16. The gyroscopic level. As yet it is not completely developed, but it should be an important part of airplane equipment when it is made in a thoroughly practical form.

17. Trigonometrical height finders, and Theodolites.

Tanle for obtaining Speed (m.p.h.) from a Pressure Tube Speed Indicator.

Let S = actual speed.
S_o = speed indicated on the instrument.

then $S = S_oC$, where C is the quantity given in the table, and which

depends on the temperature and the pressure of the air. It is assumed that the indicator has been graduated to indicate speed correctly at barometric pressure of 30" and temperature of 70° F.

	Barometric height in inches of mercury.					
t°F.	20"	22"	24"	26"	28"	30"
0	1.14	1.08	1.04	0.98	0.96	0.93
30	1.17	1.12	1.07	1.03	0.99	0.96
60	1.21	1.16	1.11	1.06	1.02	0.99
90	1.25	1.19	1.14	1.10	1.06	1.02

This table is given in its full form in the Annual Report of the National Advisory Committee for Aeronautics, 1915, p. 97.

THE COMPASS IN AIRPLANES.

The compass has recently become important as an airplane instrument. When long flights are attempted in the daytime, if the landmarks are not thoroughly familiar to the pilot, it is generally advisable to steer with the compass. At night, in the lack of stars or surface indications, the compass is the only thing to afford an idea of directions. The magnetic compass is now the only thoroughly practical type, as the gyroscopic compass, used on airplanes, is still in a more or less experimental stage.

Construction.

The magnetic compass used on airplanes, as also on ships, is different from that used on land in that the needles are attached to the card, and consequently the whole card rotates with the needles. The card rests on a pivot, which, in turn, is held inside what is known as a bowl. The bowl is perhaps four inches in diameter, to accommodate a card slightly smaller, This bowl is supported in one of two different ways. Either it is held in "gimbal rings", or it is supported by a system of shock absorbing buffers. The purpose of the gimbal rings is to always keep the upper surface of the bowl horizontal. This is assisted by putting a weight in the bottom of the bowl. The use of the gimbal mounting is practically universal in ship compasses, but it seems that the other and more modern type of mounting, employing an inner and an outer bowl, and a specially made card is better suited to the particular conditions of an airplane.

The "lubber's line" is a mark on the inside of the compass bowl, usually in the form of a piece of bent wire, used to compare the heading of the machine with the compass card. It is placed so that it is directly ahead of the pivot, except in certain cases when it is moved sideways out of the central line for a definite reason.

There are two types of compasses, the liquid and the dry types. A liquid compass is one in which the card is submerged in a liquid which fills the bowl. This liquid is composed of a mixture of alcohol and water. The liquid serves two purposes. First, by the use of a flotation chamber on the card, it releives the pivot of a large percentage of the weight of the card. In the second place, the liquid has the effect of damping the oscillations of the card. The dry compass is, as the name indicates, a compass without a liquid, the card of which rests with its whole weight upon the pivot. There are generally two or more needles mounted on the card. The large marine compasses may have six, or even more. The needles in a liquid compass are generally longer and more powerful than those of a dry compass.

Errors of the Compass.

The Variation. The variation is due to the fact that the north magnetic pole does not coincide with the north geographic pole. The north magnetic pole is approximately in longitude 97° west, and latitude 70° north. It is therefore located in northern Canada. The compass will, if undisturbed, point towards the magnetic pole, and not towards the geographic pole. A map course would be defined as being the angle made by the line going from the starting point to the destination of the flight, with the map meridian. The magnetic course would be the angle made by the same line with the magnetic meridian--that is, the magnetic direction of the north magnetic pole. The Variation is

the difference in direction between the two poles. In Flanders the variation is about 14° W, in London, about 15° west; and here in Berkeley it is about 18° east. While the variation is, in a sense, a compass error, it is not all an annoying one, for wherever we may be on the earth, we can know the variation of that place. The correction of courses for the variation is a very simple matter.

The Deviation. The deviation is caused by the presence of magnetic materials in the airplane itself. The engine is generally composed almost entirely of magnetic materials. The struts are frequently magnetic. Sometimes even the wing frames are made of steel. Besides these there are numerous wires, some moving and others fixed. Every one of these things will cause a certain amount of deviation. A machine gun, if one is carried may produce a marked deviation; likewise bombs and armor. It is possible to so design a machine that the deviations are reduced to a minimum, but this is generally not feasible in the case of a machine designed for war purposes. The Curtiss trans-Atlantic airplane had deviations which amounted to hardly more than two degrees, while a war machine has been known to have deviations in excess of thirty degrees. The deviations may be divided into two classes, the deflections caused by magnetic masses that are fixed in relation to the machine, as struts, wing frames, or immovable wires, and the variable deflections caused by moving magnetic masses. Variable deviations would be caused by sliding control wires, the moving machine gun, the engine, besides bombs and tools, and such objects. The fixed deviations are easy to deal with in comparison to the variable ones, in that they may in general be compensated for without much difficulty.

The Placing of the Compass on an Airplane.

The conditions which should determine the proper place for the Compass on an airplane are as follows:

(1) The compass should be placed where it can be easily read by the pilot.
(2) It should be placed symmetrically with respect to the disturbing masses of metal. (This usually requires that the instrument should be placed in the longitudinal axis of the airplane.)
(3) It should be placed as far as possible from the disturbing masses, especially those producing variable deviations. This distance should always be greater that three feet, if possible.
(4) I should be placed where the vibration is not excessive.

Compass Adjustment.

Compass adjustment consists in the partial elimination, or--more properly--compensation of the magnetic disturbances known as deviations. It is effected by applying magnets in such a manner that the disturbances are neutralized. In determining the deviation the progess is to "swing" the airplane--that is--point it successively to the various points of the compass, noticing the difference between the indications of the compass and what the indications should be were there no deviations. The deviation is said to be west if the north point is displaced westward, and east if the north point is displaced eastward. Generally in preparation for determining the deviations, lines are drawn on the ground indicating the true magnetic directions. These are laid out with the assistance of an undisturbed compass, or by astronomical methods.

If the machine is put on the intersection of the north-south and east-west lines, its true magnetic heading can be readily determined. The process is one of continued trial and adjustment with the compensating magnets, at the cardinal points--north, south, east, and west--till the indications at those points are practically correct. However, there will generally be left outstanding deviations in the intermediate positions. If these cannot be taken out by further adjustments, it will be necessary to determine them accurately, and allow for them in computing the course.

The compensating magnets used in adjusting the compass are generally placed quite close to the compass itself, usually below it, but sometimes above it or on the side. It is most convenient to have the compensating magnets below the compass if the deviations can be properly accounted for by such a position. They are more out of the way, and less subject to accidental motion.

Example: A machine has been compensated as nearly as possible with the magnets. It is then pointed at the various headings, usually eight, and the deviations are noted. A "Table of Deviations" is given below. Column one gives the magnetic heading, and column two the corresponding angle in degrees. Column three shows what the compass reads, and four, the deviation. It is the difference between columns two and three.

One	Two	Three	Four
N	360	359	1 E
NE	45	51	6 W
E	90	89	1 E
SE	135	131	4 E
S	180	180	0
SW	225	233	8 W
W	270	268	2 E
NW	315	309	6 W

It is sometimes thought more convenient to represent these deviations on a graphical construction, called a "Curve of Deviations". The curve is slightly easier to use, in that it saves interpolation to obtain deviations on courses intermediate to those given in the table.

Other Compass Errors.

Error due to the turning and tipping of the machine. In turning a corner there are two principal factors which tend to produce disturbances in the indications of the compass. (1) The effect of centrifugal force on the compass card. (2) The change in the relation of the deviation producing masses of magnetic metal to the compass, caused by banking or pitching.

(1) The magnetic field of the earth which affects the compass needle is not parallel to the surface of the earth except at the magnetic equator. At the magnetic poles of the earth, the field is perpendicular to the surface, and the directive effect of the needle is zero. At parts of the earth intermediate to the magnetic poleaand equator the earth's field is inclined down by a certain angle, which is called the dip. Compass needles would therefore tend to tilt downwards toward the north (above the magnetic equator) were they not weighted on their south ends. It is this inequality in the weight of the two ends of the compass needle which tends to produce large displacements of the

card. In turning a corner the centrifugal force set up acts to throw the heavy end out on the curve. In the case of a sudden turn the card may be thrown completely around. The sharper and more rapid the turn, the greater will the disturbing effect be, no matter whether the machine banks or skids on the turn.

(2) The error due to the change in the amount of the deviations in banking is relatively not so important. It is called the "heeling error", in the case of ship compasses. For banking, the error is more pronounced on north-south courses than on east-west courses. Its effect may be completely hidden in the greater centrifugal displacement. It is possible to compensate this error by means of a heeling corrector, though in the case of airplane compasses it is not usually done.

Error due to vibration. This error varies very greatly with conditions. It depends upon a number of different factors, such as the damping of the card, the support of the instrument, besides upon the nature of the engine, and other things. Many machines will have no deflection at all due to vibration, the determination of its importance is entirely a matter of experiment for each machine.

Practical Use of the Compass.

The compass deviations are removed by the process of adjustment, first because they have a tendency to make the card unsteady, and second, to save the annoyance of correcting magnetic courses to compass courses before being able to steer them on a compass. It is entirely possible to correct the compass not only for deviation, but for the variation also. When this is done, the pilot will steer on his compass a geographic course, just as it was taken off the map.

One of the simplest ways to do this is merely to move the lubber's line away from the longitudinal axis of the airplane. It should be moved sideways by an angular amount which is just sufficient to cause the variation effect to disappear. For instance, if the variation at the place where the airplane is in use is say 15° W, the variation would be eliminated if the lubber's line is moved 15° to the left, or to the west, if the machine is heading north. This correction once made is general for all courses, but it ceases to be correct if the variation changes, i.e. if the airplane is moved far enough over the earth to noticeably change the value of the variation.

The error due to turning is apt to appear when flying in clouds, or on a dark night when neither landmarks or stars are visible. The machine may make a turn, but the centrifugal force causes the card to turn in the same direction, but farther. This tells the pilot that he has made a turn in one direction, when actually he has turned the other way. For instance, a pilot may have been steering a course due north, and then turns toward the north-east. The compass card may turn in the same direction, but further, indicating a turn to the north-west, perhaps. In attempting to correct his course, the pilot will almost invariably overshoot the proper course, and the card will then begin to oscillate back and forth, as a result of over-correction first on one side, then on the other. It is found that best way to steady down a card once it has started its oscillations, is to first find some fixed object on the ground or in the sky, and then steer towards it till the compass settles down again.

H. M. J.

APPENDIX E5

Contains the following:

Copy of Syllabus of ENGINES DEPARTMENT

Furnished to Cadets. (30 pages)

T O O L S

Micrometer

Thickness (feeler) gage

Screw Pitch gage

Common threads - U.S.S. and S.A.E.

Files

- Safe edges
- File card

C A R E O F E N G I N E S

Inspection

Tinkering

Changing oil

Covering at night

Draining radiator, cold weather

Handling

- Uncrating
- Moving
- Installing

E N G I N E A C T I O N

Broad division of engines into two classes:-

1st - Fixed cylinder, subject of present lectures

2nd - Rotating cylinder, to be studied later.

ESSENTIAL REQUIREMENTS:-

Light weight
Low fuel consumption.
Reliability

POWER:-

Definition of H.P.
Brake H.P. and indicated H.P.
Weight per H.P.

VELOCITY:-

Meaning of r.p.m.
Enginer speed, equivalent to crankshaft speed

SOURCE OF POWER:-

Pressure due to heating confined gases, pressure increasing with temperature

TRANSMISSION OF POWER:-

Charging of cylinder
Combustion and rise in pressure
Pressure on piston delivered through wrist pin, connecting rod and crankshaft to propeller.

DISCUSSION OF PARTS - their functions, construction and materials:-

Cylinders:-
Names of parts
Description of Curtiss OX, Hall-Scott, Sturtevant and welded cylinders, with especial reference to

Cylinder material
Water jacket material
Method of attaching cylinder and water jacket.
Valve location
Detachable cylinder heads
Single, pairs, blocks of 3 and 4.
How attached to crank case
Meaning of cylinder bore

Valves:-
- Function
- Materials - tungsten steel, nicket steel, etc.
- Face - angles of face
- Stem
- Spring
- Valve action, to be studied later in detail.

Pistons:-
- Function
- Materials, aluminum alloy, cast iron, steel
  - advantages of aluminum alloy
- Names of parts
- Piston clearance - definition
  - reasons for
  - greater at top of piston
- Definition of stroke of piston

Piston Rings:-
- Function
- Materials, cast iron, steel
- Types of joints, diagonal and step
- Number used per piston
- Oil rings

Wrist Pins:-
- Function
- Material, steel, case hardened
- Hollow, account of lightness and lubrication
- Methods of retention
- Location of wrist pin bearing

Connecting Rods:-
- Function
- Material
- Upper end, bronze bushings
- Body, types, I-beam, H-section and tubular
- Lower bearing
  - split
  - bronze backed babbitt bearings
  - types- plain, forked and articulated

Crank Shaft:-
- Function
- Material
- Names of parts

Crank Case:-
- Functions
- Material, aluminum alloy
- Upper half
- Sump
- Splash pans and partitions

Thrust Bearings:-
Functions
types, - Double plain ball thrust
Single row annular
Double row annular

FOUR-STROKE CYCLE:-

Definition of cycle
Relation of piston stroke to crankshaft revolution
Names of strokes

Intake or suction
Compression
Power or expansion
Exhaust

1 - Intake or suction:-
Direction of piston travel
Creation of partial vacuum
Action of valves
Carburetion
Intake manifold

2 - Compression:-
Direction of piston travel
Action of valves
Compressing of charge
Ignition and combustion of charge
Point of ignition under working conditions - reason
Degree of compression
Relation between compression and efficiency of engine
Heat of compression
Limit of compression - pre-ignition

3 - Power or expansion:-
Direction of piston travel
Action of valves
Initial temperature and pressure
Pressure drop in cylinder
Combustion chamber
Heat loss - water jacket, exhaust, friction
Back-kick
Mis-firing

4 - Exhaust:-
Direction of piston travel
Action of valves
Back-firing

DIRECTION OF ROTATION:-

Four-stroke engine not reversible
Method of finding direction of rotation, valve action.

NORMAL and ANTI-NORMAL ENGINES:-

Definitions
Geared propeller drives

TYPES OF CYLINDERS:-

Comparison of T-head, L-head and I-head or overhead-valve cylinders, with reference to weight, efficiency and location of valves.

VALVE ACTIONS:-

Direct
Short rocker arms
Push rods, pull rods and rocker arms
camshaft - construction and speed of rotation
Valve clearance

MULTI-CYLINDER ENGINES

Advantages:-
Lighter - less weight per H.P.
Smoother application of power
Less vibration
Higher speed

Types:-
Vertical - 4 and 6 cylinder
Vee - 8 and 12 cylinder
lighter and more compact

General discussion:-
Space between explosions = $\frac{720^{o}}{\text{Number of cylinders}}$

Any two cylinders with piston travelling together will fire one revolution apart (or 360°)

Cylinder numbering:-
Vertical engines number from pilot's end toward propeller
Vee type numbered according to various systems
a - Curtiss numbering
b - Other numbering

Relation between firing orders and balance

Relation between direction of rotation and firing order

Method of finding firing order

FIRING ORDERS:-

4-cylinder vertical:-
4-cylinder crankshaft, crank pins #1 and #4, #2 and #3 always working together
1-3-4-2 firing order generally used, 1-2-4-3 equally good but less common.

8-cylinder engines:-

4-cylinder crankshafts used, each crank pin receiving power from two cylinders, one in each block
Reasons for Vee and for angle of Vee (90°)
Firing order, normal Curtiss OX - 1-2-3-4-7-8-5-6
Firing order, normal Curtiss VX - 1-8-3-6-7-2-5-4
Standard firing orders
using either four-cylinder firing order in each block, starting at opposite end of engine in each block and alternating between blocks

6-cylinder vertical engines:-

Crankshaft throws 120° apart, #1 and #6, #2 and #5, #3 and #4 always working together
Crankshaft can be built in either of two ways with reference to relation between throws
Firing orders:-
most common - 1-5-3-6-2-4 (Hall-Scott A-5-a, normal)
less common - 1-4-2-6-3-5

12-cylinder Vee type engines:-

6-cylinder crankshaft used
Angle of Vee for evenly spaced explosions, 60°
angle usually decreased to reduce head resistance
Firing order, same principle as standard eight-cylinder firing order, using either of the basic 6-cylinder firing orders in each block.

VALVE TIMING:-

Factors affecting valve timing
Inertia of gases, speed of piston, size and shape of manifold, location, size, lift and number of valves per cylinder
Methods of timing valves
Angular, as used by Hall-Scott, Liberty, Sturtevant, etc.
Linear, as used by Curtiss engines
Lead of valve - opening before center position
Lag of valve -- opening after center position

Angular Method:-
Measurement of crankshaft travel in degrees
Example - Hall-Scott A-5-a timing diagram:-

Linear Method:-
Measurement of linear travel of piston in cylinder
Example - Curtiss OX timing

Lead, lap and lag
Reasons for having

Adjustments and effect of each on valve timing
Camshaft
re-meshing of camshaft gears
means of adjusting between teeth
Valve clearance
Purpose
expansion of valve stem
adjustment of valve timing
Method of adjustment
Effect of camshaft out of time and clearance wrong

Steps to be taken in timing an engine:-
1 - find direction of rotation of crankshaft and camshaft
2 - Place timing disk on crankshaft and check its position
3 - Adjust valve clearance on #1 exhaust valve to standard width, valve to be tight closed and cam turned away from its follower
4 - Turn crankshaft in proper direction until #1 crank pin is in position for exhuast valve to close
5 - Unmesh timing gears and turn camshaft in proper direction until #1 exhaust valve has just closed, check closing by watching for light between valve stem and tappet.
6 - Mesh timing gears
7 - Check opening of #1 exhuast valve, re-adjust camshaft and clearnace of this valve if necessary
8 - Adjust clearance on remaining valves so that all exhaust valves close on time and all intake valves open on time.

L U B R I C A T I O N and C O O L I N G

THEORY:-

All machined parts are rough. Two surfaces rubbing together produce friction.

Oil film is formed between bearing surfaces. Parts do not touch. This oil film serves to cut down friction and wear and to carry away the heat generated by friction. Fluid friction is less than solid friction.

Bearings - hard steel shaft - soft babbit bearing.
Babbit - copper, tin, lead, antimony, zinc

REQUIREMENTS OF A LUBRICANT:-

1 - Sufficient viscosity to keep surfaces from contact
Viscosity - rate of flow of oil through a capillary tube or orifice compare with rate of flow of pure sperm oil through same tube at same temperature.
2 - Greatest possible fluidity consistent with above
3 - Lowest possible coefficient of friction
Proportional to viscosity
Friction depends on area (proportional) - independent of pressure, proportional to square of velocity, independent of surfaces but dependent somewhat upon their roughness.
4 - Capacity for storing and carrying away heat
5 - High temperature of decomposition
6 - High "flash" point and burning point (20° above flash). Flash point is temperature at which oil gives off sufficient vapor to form a temporary flash when a flame is brought near (open and Abel's testers), 300° to 500° F. and above
7 - Power to resist oxidation
8 - Freedom from acid and alkali which would corrode metals
9 - Should not thicken too much when cold
10 - Should not leave deposits

KINDS OF LUBRICANTS:-

Mineral:-
Petroleum - fixed cylinder engines
Procured by fractional distillation of crude petroleum
Can be used repeatedly if screened
Will not oxidize
Will not leave much of a carbon deposit - lighter oil leaves less.

Organic:-
Animal and vegetable - rotary engines.
Castor oil principal one used in airplane engines
Will not mix with gasoline
Higher viscosity, expecially at working temperatures
Cannot be used over
Oxidizes quickly, becoming gummy
Has poor cold test
Contains acids which are freed at high temperatures

Mixed:-
Mineral and organic.

PRINCIPAL COMPONENTS OF OILING SYSTEMS:-

Pumps:-
- Plunger - less reliable, spring return, valves, small capacity
- Gear - reliable, high pressure, weight less per unit of discharge, uniform pressure.

Gauges:-
- Pressure, flow, sight, etc.

Relief Valves:-

Filter Screens:-
- Purpose - eliminates carbonized oil, filings, etc.
- Location

Sump and auxiliary tanks:-

Reclamation:-
- Dry sump

TYPES OF OILING SYSTEMS:-

Partial force feed (Hall-Scott)
Full force feed (Curtiss OX, Liberty 12, Hispano-Suiza)
- Reasons for force feed
  - shortens and lightens bearings
  - Oil at all positions of engine
  - Required amount delivered where needed
  - Pressure gauge indicates action of system

OIL COOLING SYSTEMS:-

Benefits derived
Types
- Jacketed intake manifold (Hall-Scott)
- Radiator (Hispano-Suiza)
- Auxiliary tank (Sturtevant)
- Carburetor air intake through sump

OILS USED:-

Hall-Scott:-
- Summer - Mobile "A"
- Winter - Zerolene Heavy Duty

Curtiss:-
- Summer - Mobile "B"
- Winter - Mobile "A" (lighter)

COOLING SYSTEMS:-

Reasons for.

WATER COOLING:-

Advantages:-
Better cooling
Higher compression
More even cooling of parts of cylinders

PUMPS:-

Gear - positive
Centrifugal - permits flow whether pump is operating or not.
best type

THERMO-SYPHON SYSTEMS:-
RADIATORS:-

Tank and cooler
Types, tubular and cellular
Repair of radiators
Cleaning of radiators
Location in plane

WATER JACKETS:-

WATER PIPING AND HOSE CONNECTIONS:

Precautions

ANTI-FREEZING SOLUTIONS:-

Kinds used
Disadvantages
Rarely used on the front

AIR COOLING:-

Engine sometimes lighter
Requires larger valves
Limit to bore of cylinder, 4-1/2" to 5"
No water jackets, radiators, water pump, etc., required
Low compression necessary, not more than 75# per square inch
Newton's law, cooling directly proportional to velocity of air and
to exposed surface area.
Cooling flanges
Blowers
Types using air cooling
All revolving cylinder engines
Radial, Anzani, etc.
Fixed cylinder engines, Renault, R.A.F.

C A R B U R E T I O N

GASOLINE:-

- Chemical composition
- Physical properties
- Density
- Boiling point

MIXTURES OF GASOLINE AND AIR:-

- Theoretical mixtures
- Practical mixtures
- Imperfect mixtures
  - Indications of imperfect mixtures
- Limits of explosibility

PRINCIPAL PARTS OF A SIMPLE CARBURETOR:

- Mixing chamber:-
  - Simple jet
  - Factors controlling flow through jet
  - Choke tube
    - Purpose of choke tube
  - Throttle
    - Engine speed controlled by throttle
    - Types of throttles
- Float chamber:-
  - Float
  - Needle valve and operating mechanism

ACTION OF A SIMPLE CARBURETOR AT DIFFERENT SPEEDS:-

- Tendency toward richer mixture with increased speed
- Need of compensation
- Methods of compensation

NECESSITY FOR HEAT:-

- In carburetor:-
  - Vapor saturation point
  - Cooling effect of evaporating gasoline
  - Methods of heating
- In intake manifold:-
  - Condensation
  - Methods of heating

EFFECT OF ALTITUDE:-

- Effect on density of air
- Effect on mixture
- Methods of correction
  - Manually operated

ZENITH CARBURETOR:-

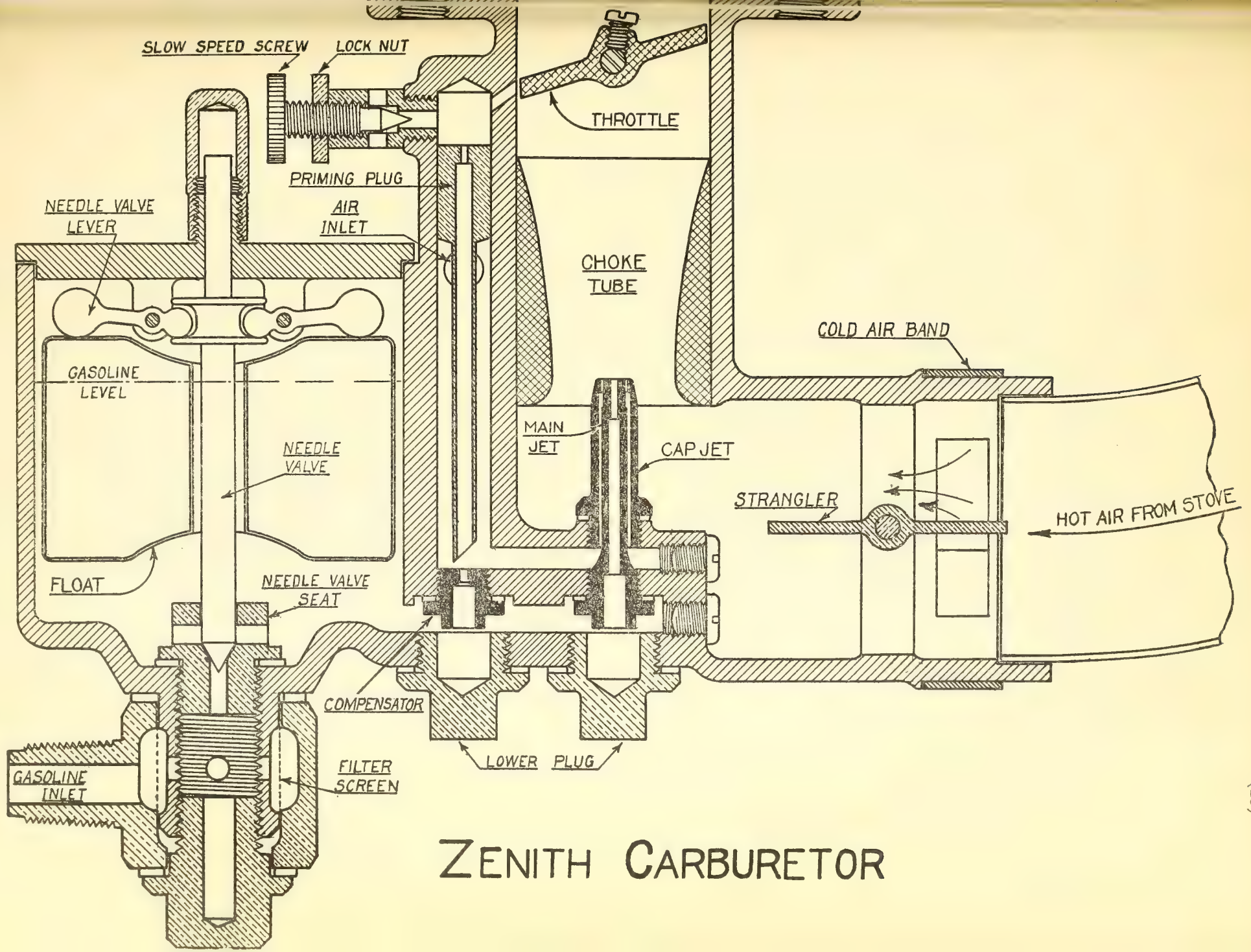
- Main carburetor for normal speeds:-
  - Compound nozzle
    - Main jet and cap jet
  - Compensating plug
  - Action of each jet
  - Choke or Venturi
  - Throttle
  - Strangler
- Secondary carburetor for idling speeds:-
  - Why it is necessary
  - Priming plug
  - Regulator (slow speed) screw
  - Throttle stop screw
- Carburetor settings:-
  - The four variables of the Zenith carburetor
  - How numbered
  - Relative speed at which each has its greatest effect on the mixture
  - Effect on the mixture of different changes of setting
- Adjustments of the Zenith carburetor:-
  - Adjustments for idling
  - Regulator (slow speed) screw
  - Throttle stop screw
  - Float level adjustment

MILLER AVIATION CARBURETOR:

- Float chamber:-
  - Float
  - Needle valve and operating mechanism
  - Screen and dirt trap
- Mixing chamber:-
  - Absence of Venturi
  - Jets
    - Meaning of jet numbers
    - Construction
    - Location
    - Idling jet
  - Throttle:-
    - Type
    - Throttle stop adjustment
    - Provision for lubrication
    - Coil spring to return throttle to closed position
  - Method of setting carburetor
  - Damper

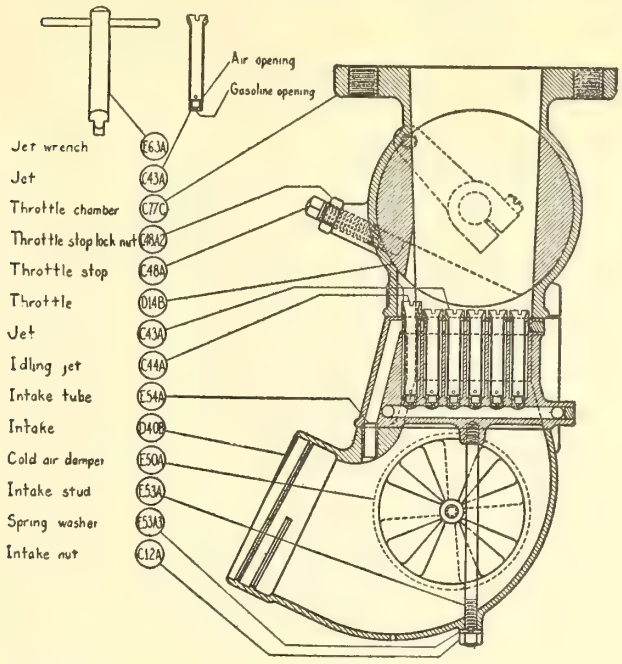
SIX-CYLINDER AND VEE ENGINES:-

- Disadvantages of using one carburetor
  - How offset
- Duplex carburetors
  - Advantages of duplex carburetors

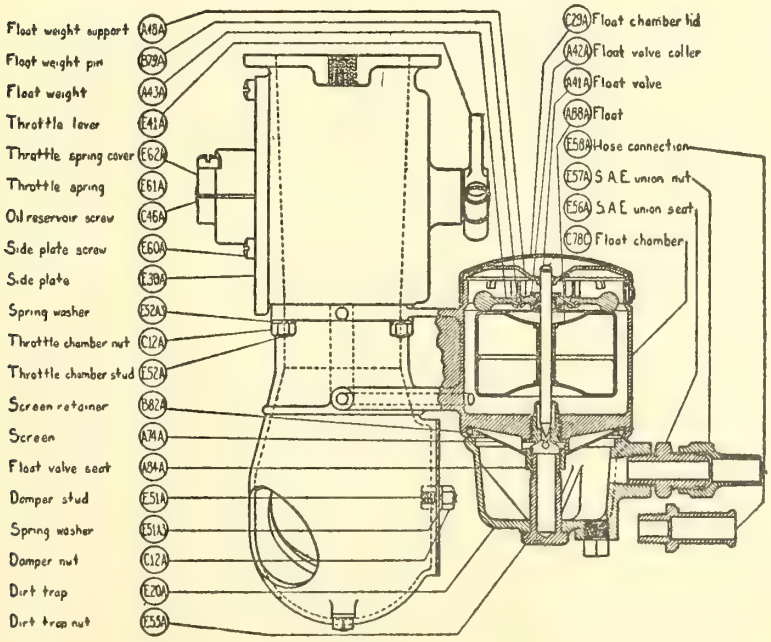


ZENITH CARBURETOR

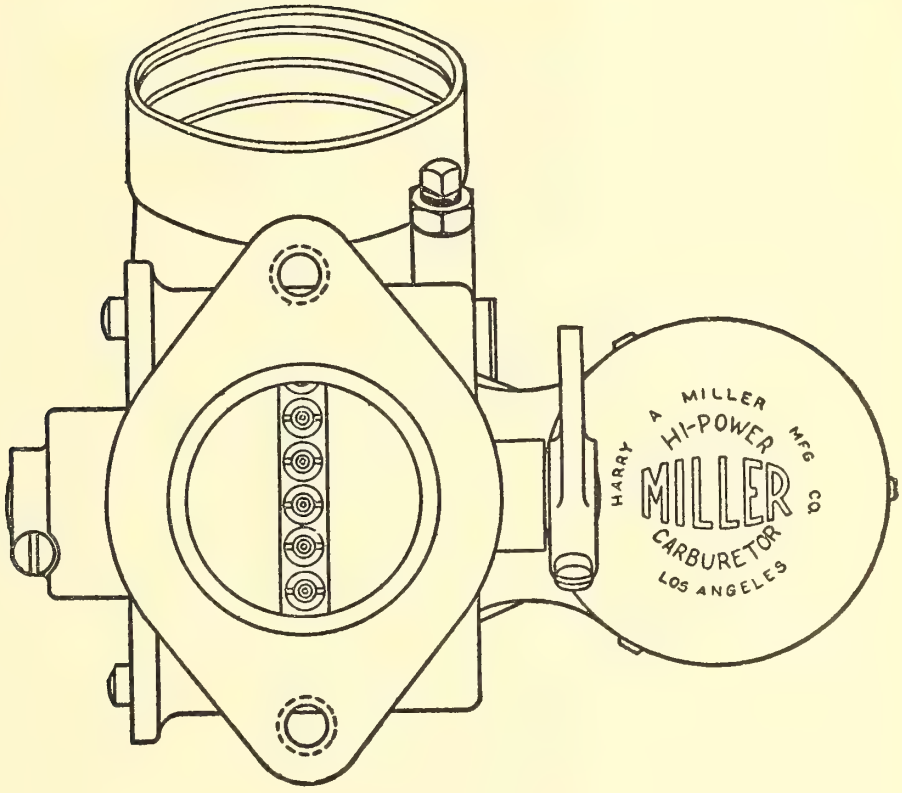
SECTIONAL VIEW OF THROTTLE AND JET HOLDER



SECTIONAL VIEW OF FLOAT CHAMBER



TOP VIEW


HARRY A MILLER
HI-POWER
MILLER
CARBURETOR
MFG CO
LOS ANGELES

GASOLINE FEED SYSTEMS:-

Gravity
Air pressure
    Accessories necessary
Vacuum systems
Gasoline pump systems

R O T A R Y E N G I N E S

GENERAL FEATURES:-

Rotating parts
Stationary parts
Disposition of cylinders
Cooling
Advantages and disadvantages

MAKES IN GENERAL USE:-

Gnome
Le Rhone
Clerget
Oberursal

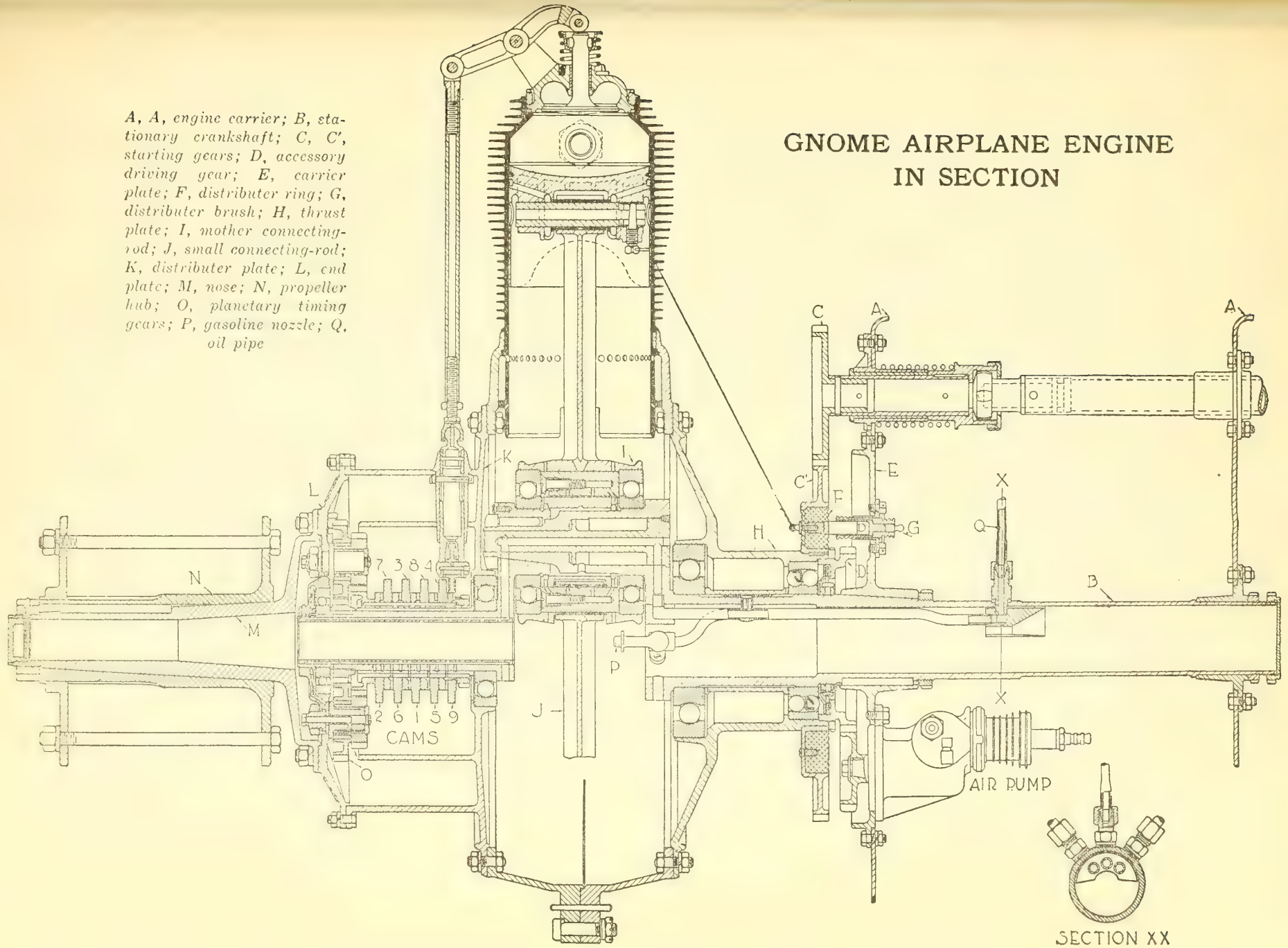
GNOME MONOSOUPAPE:-

9-cylinder, 100 H.P. at 1,200 r.p.m.
Bore, 110 mm, stroke 150 mm
Weight of land type with accessories, 260#

Crankshaft:-
    Machined from chrome nickel steel drop forging
    Hollow
    Made in two parts to permit of assembling master connecting rod
    Taper joint at propeller end of crank pin, keyed and held with lock nut
    Single crank throw set facing vertically upward
    Back plate and centralizing plate fastened to crankshaft and bolted to bearer plates
    Crankshaft stationary and supports engine in plane

GNOME AIRPLANE ENGINE IN SECTION

A, A, engine carrier; B, stationary crankshaft; C, C', starting gears; D, accessory driving gear; E, carrier plate; F, distributer ring; G, distributer brush; H, thrust plate; I, mother connecting-rod; J, small connecting-rod; K, distributer plate; L, end plate; M, nose; N, propeller hub; O, planetary timing gears; P, gasoline nozzle; Q, oil pipe



Cylinders:-

Machined from nickel steel forging
Air cooled, integral cooling and base flanges
Fifty 5 mm. holes drilled below bottom base flange serve as inlet ports from crankcase
Spark plug boss welded in leading face of cylinder
Single valve in head of each cylinder, serves as exhaust valve and for inlet of fresh air
Valve cage fits on copper asbestos gasket on shoulder in cylinder head, held in by ring nut.

Crank Case:-

Split in plane of cylinders
Two halves machined from similar steel forgings, held together by 9 bolts and centered by 9 dowel pins
Space between two base flanges on cylinders clamped between halves of crank case
Third base flange prevents cylinders from rocking
Key prevents cylinders from turning

Connecting rod assembly:-

Hub and shank of master connecting rod made in one piece
Machined from chrome nickel steel drop forging
Master rod hub revolves on crank pin on two single row annular ball bearings
8 other rods pinned to master rod hub

Piston:-

Made of cast iron, with concave head
Piston bosses attached to piston head
Two piston rings; Obturator ring with packing ring and oil ring
Trailing edge of piston skirt cut away to prevent interference of pistons

Valve Gear:-

Valve operated by push rod and rocker arm
Balanced to offset effect of centrifugal force
Light valve spring
Tappet moves in bronze guide held in flanges of distribution case
Cam pack consists of cam gear and 9 hardened steel cams keyed to steel sleeve with bronze bushing and held together with ring nut.
Revolves on propeller end of stationary crank shaft
Driven by planetary gears in direction of engine rotation at one-half engine speed.

Propeller:-

Propeller hub keyed on to "nose" bolted to distribution case
Thrust of propeller carried through crank case to double row annular ball thrust bearing at pilot's end of crankcase.

Ignition system:-

Single high tension magneto mounted on face of back plate
Gear on magneto armature shaft meshes with spur wheel, armature driven at 2-1/4 times engine speed
High tension wire from magneto leads to stationary brush mounted on back plate.
Brush wipes segments of high tension distributor mounted on pilot's end of crank case
Bare brass wires connect segments of distributor with spark plugs
Cylinder numbering - #1 cyl. contains Master con. rod
Firing order 1,3,5,7,9,2,4,6,8,

Carburetion system:-

Engine driven air pump mounted on face of back plate maintains 5# air pressure on gasoline and oil tanks
Air pressure gauge and pressure relief valve in cockpit
Gasoline from tank fed through fine adjustment needle valve, controlled by pilot, to spray nozzle in crank case
Method of controlling engine speed
Mixture in crank case very rich, non-explosive
Mixed with pure air in cylinder of engine
Gasoline consumption 10 gallons per hour (normal)

Oiling system:-

Engine driven double plunger oil pump mounted on face of back plate
Two leads through hollow crank shaft
Two pulsators in cockpit
Part of one lead to thrust box, remainder to cams, gears, tappet rollers and rocker arms
Second lead to connecting rod assembly and piston pins
Splash feed to pistons and cylinder walls
Oil consumption, 2-3/4 gallons of castor oil per hour

Valve timing:-

Set spark occurs	18° before T D C on compression stroke
Exhaust opens	35° after T D C
Exhaust closes	120° after T D C, 395° later
Inlet ports uncovered	20° before B D C
Inlet ports covered	20° after B D C

LE RHONE ENGINE:-

9-cylinder, 80 H.P. at 1,200 r.p.m.
Bore 105 mm., stroke 140 mm.
Weight with accessories, 240#

Cylinders:-
- Machined from steel forgings
- Integral cooling flanges
- Cast iron liner shrunk in
- Inlet and exhaust valves in cylinder head
- Spark plug boss in leading face
- Threaded at base and screw into crank case - locked by ring nut

Crankshaft:-
- Similar to that of the Gnome

Crank case:-
- Made in one piece, of steel
- 9 holes around circumference, threaded to take cylinders
- Distribution case and thrust box bolted to crank case

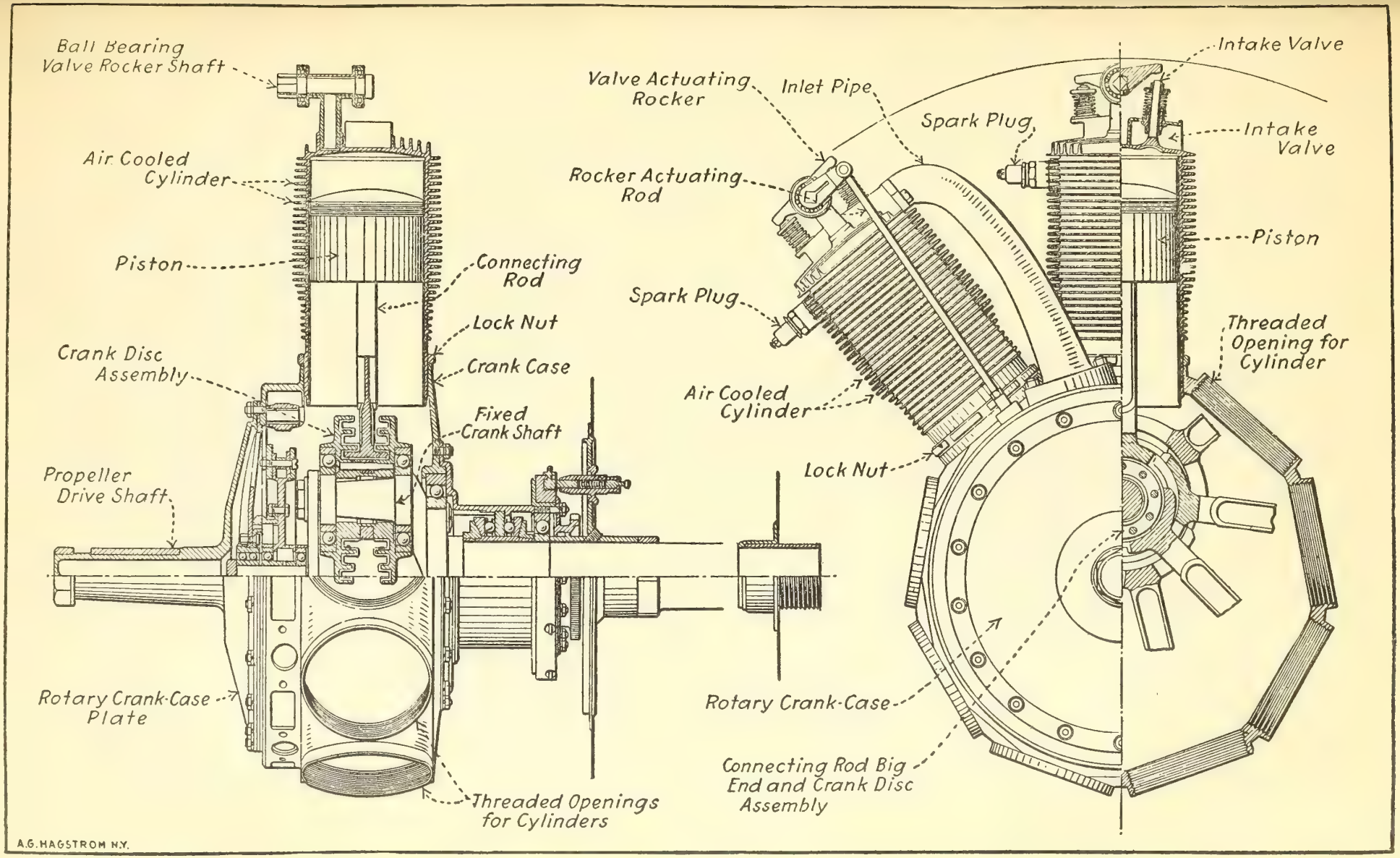
Connecting rod assembly:-
- H-section rods machined from drop forged steel
- Shoes on big end of rods fit in annular grooves in common hub
- Hub revolves on crank pin on two single row annular ball bearing
- 3 grooves in hub, 3 rods in each groove, rods in 3 lengths

Pistons:-
- Cast iron
- 4 steel rings
- Convex head
- Hollow steel piston pin locked in piston bosses
- Trailing edge of piston skirt removed

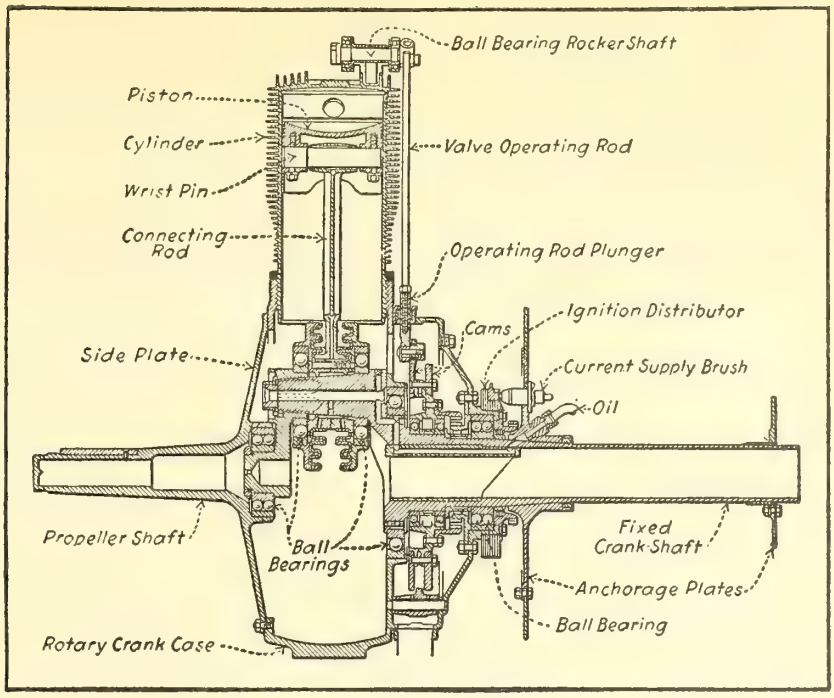
Valve gear:-
- Valves in cylinder head operated by push and pull rod
- Cam roller rocker arms
- Cam plates

Propeller:-
- Fastened to extension of crank case
- Thrust carried through crank case to double ball thrust. bearing at pilot's end of crank case.

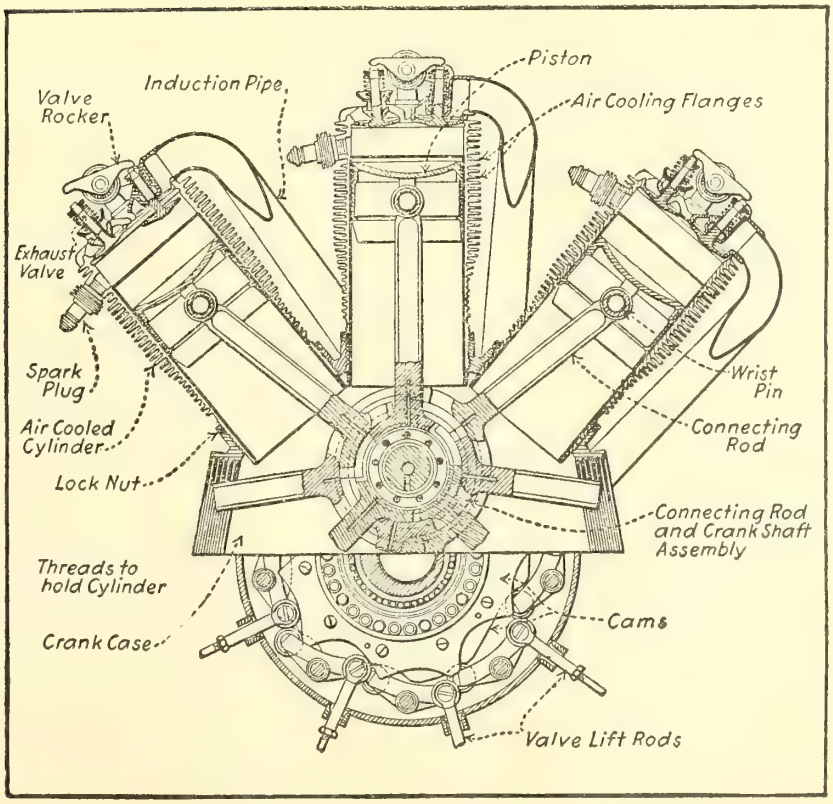
Ignition system:-
- Similar to that of the Gnome



—Part Sectional Views of Le Rhone Rotary Cylinder Engine, Showing Method of Cylinder Retention, Valve Operation and Novel Crank Disc Assembly.



Side Sectional View of Le Rhone Aviation Engine.



View Showing Le Rhone Valve Action and Connecting Rod Big End Arrangement.

Carburetion system:-
Carburetor at pilot's end of hollow crank shaft
Slide throttle
Metering pin
Air intake from outside fuselage
Back-fire screens
Explosive mixture in crank case
Induction pipes to intake valve in each cylinder
Gasoline consumption, 8-1/2 gallons per hour

Oiling system:-
Engine driven oil pump mounted on face of back plate
Pulsator
One oil lead
Branches
Oil consumption, 1-1/4 gallons per hour

Valve timing:-

Set spark occurs	26° before T D C on compression stroke
Exhaust opens	45° before B D C
Exhaust closes	5° after T D C
Intake opens	18° after T D C
Intake closes	35° after B D C

CLERGET ENGINE:-

9-cylinder, 130 H.P. at 1,200 r.p.m.
Bore 120 mm., stroke 160 mm.,
Weight with accessories, 365#

Crankshaft, similar to that of the Gnome

Cylinders:-
Machined from nickel steel forgings
Inlet and exhaust valves in cylinder head
Two spark plug bosses in leading face
Shoulder at base of cylinder fits in recess in crank case

Crank case:-
Similar to Gnome

Connecting rod assembly:-
Similat to Gnome - tubular rods

Pistons:-
Aluminum alloy
Piston pin support attached to piston head
Two obturator rings
3 cast iron rings
Trailing edge of piston skirt removed

Valve gear:-
Valves operated by separate push rods and rocker arms
Flat seated intake valve
Cam plates

Propeller:-
Similar to Le Rhone

Ignition system:-
Double ignition
Two high tension magnetos mounted on face of back plate
Two stationary brushes
Two rows of segments in distributor
Bare wires to spark plug

Carburetion system:-
Engine driven air pump similar to Gnome maintains 4# air pressure on gasoline tank
Carburetor at pilot's end of hollow crank shaft
Air intake from outside fuselage
Separate control of gasoline and air
Slide throttle
Explosive mixture in crank case
Induction pipes to intake valve in each cylinder
Gasoline consumption 12 gallons per hour

Oiling system:-
Single plunger oil pump mounted on face of back plate
Variable stroke of plunger
Pulsator
One oil lead
Branches
Oil consumption 2 gallons per hour

Valve timing:-

Set spark occurs	25° before T D C on compression stroke
Exhaust opens	68° before B D C
Exhaust closes	5° after T D C
Intake opens	5° before T D C
Intake closes	58° after B D C

I G N I T I O N

GENERAL - IGNITION OF INTERNAL COMBUSTION ENGINES:

1 - Necessity, to accurately time explosions
2 - Conditions affecting ignition point
    Mixture, r.p.m., position of plug, diameter of cylinder, etc.
3 - Adjustable position of spark for variable speed engines
4 - Two systems in use
    (a) Magneto - most common
    (b) Battery and transformer coil, used on Liberty engine.

FUNDAMENTALS OF ELECTRICITY:-

Sources of electricity - machines, chemicals and heat
Conductors of electricity - metals, carbon and water
Conditions governing flow of electricity:-
- a - Circuit must be complete (closed)
- b - The volt - unit of pressure
- c - The Ampere,- unit of quantity
- d - The watt - unit of power. Volt X ampere = Watt = $\frac{1}{746}$ H.P.
- e - The ohm - unit of resistance.

FUNDAMENTALS OF MAGNETISM:-

Definition - the force of attraction between two pieces of iron or steel
Conductor - Iron and steel carry magnetism about 1,800 times better than all other things
Retaining power - of iron or steel depends largely upon hardness
Care of magnets - do not jar, heat or leave without keeper

RELATION BETWEEN MAGNETISM AND ELECTRICITY:-

Electricity will generate magnetism if sent through a coil of wire
Magnetism will generate electricity if the magnetism within a coil of wire is changed

APPLICATION OF FUNDAMENTALS TO IGNITION DEVICES:-

General characteristics of Battery and Transformer Coil system:-
- a - Battery or generator furnishes direct current electricity for primary coil of transformer
- b - Transformer - primary to cause very rapid changes of magnetism in iron core. Secondary to use change of magnetism to generate electrical impulse
- c - Breaker points - separation of points stops flow of electricity in primary coil, thus cuasing a rapid change of magnetism in iron core and produces high tension impulse in secondary which is delivered to spark plugs
- d - Position of spark in cycle - "advance", best position for high speeds, "retard", later position for safety in starting

e - Condenser - prevents burning points, shortens time of break in primary circuit, causing a sudden drop in magnetism and increased voltage in secondary coil
f - Distributor - distributes secondary current to proper spark plug
g - Safety gap - prevents excessive voltage in secondary coil which would injure insulation

General characteristics of High Tension Magneto system:-
a - Permanent magnets used to magnetize iron core of primary coil
b - Magneto shaft must be turned rapidly to generate spark
c - Primary and secondary coils, breaker points, condenser, distributor and safety gap perform the same functions as for battery systems

TYPES OF HIGH TENSION MAGNETOS:-

a - Shuttle type - two coils revolve between poles of permanent magnets. Two positions in a revolution of armature at which the strongest electrical impulse is generated
1 - Bosch - position of armature core with breaker in full advance position, 1/8" to 3/16" gap. Breaker points - gap when open, .018"
2 - Berling - position of armature core with breaker in full advance position, 3/16" to 1/4" gap. Breaker points-gap when open, .016" to .020"

b - Inductor type - two stationary coils on an iron core in which the magnetism is changed by a rotating member
1 - Dixie - position of rotor at separation of breaker points .020" Possibility of more than two breaks in a revolution. Breaker point gap when open, .020"

c - Starting magneto - may be either shuttle or inductor type, hand operated through gear drive by pilot, high tension lead connecting to auxiliary brush on distributor finger

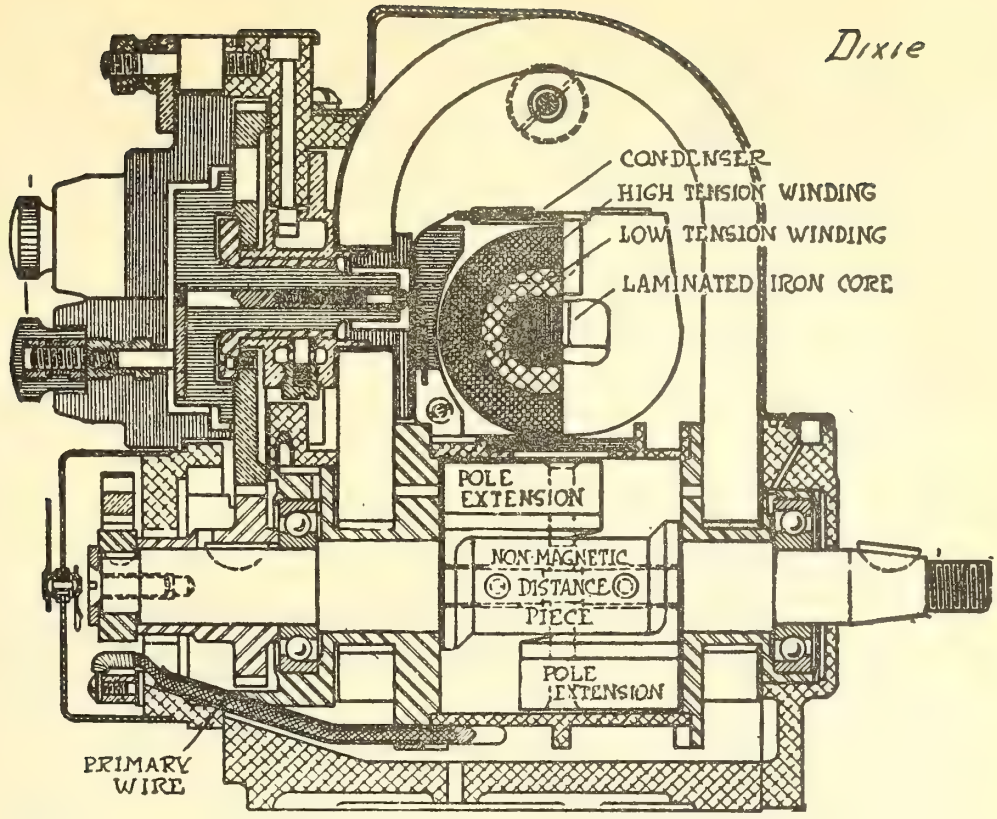
DEFINITIONS:-

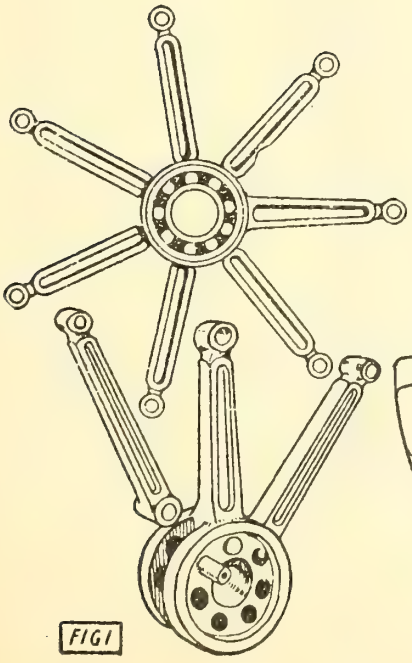
a - Single ignition, one spark per explosion

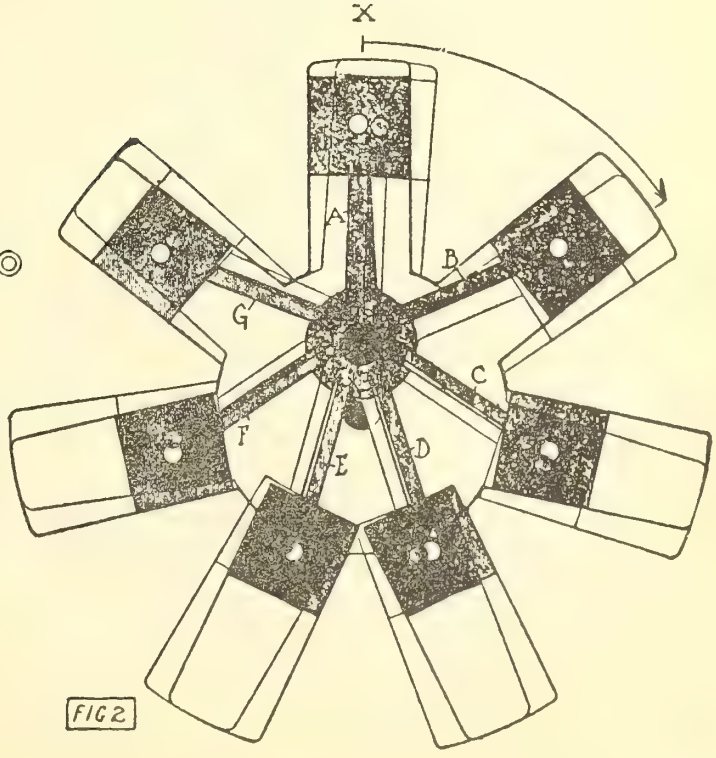
b - Double ignition, two simultaneous sparks per explosion from separate mechanisms

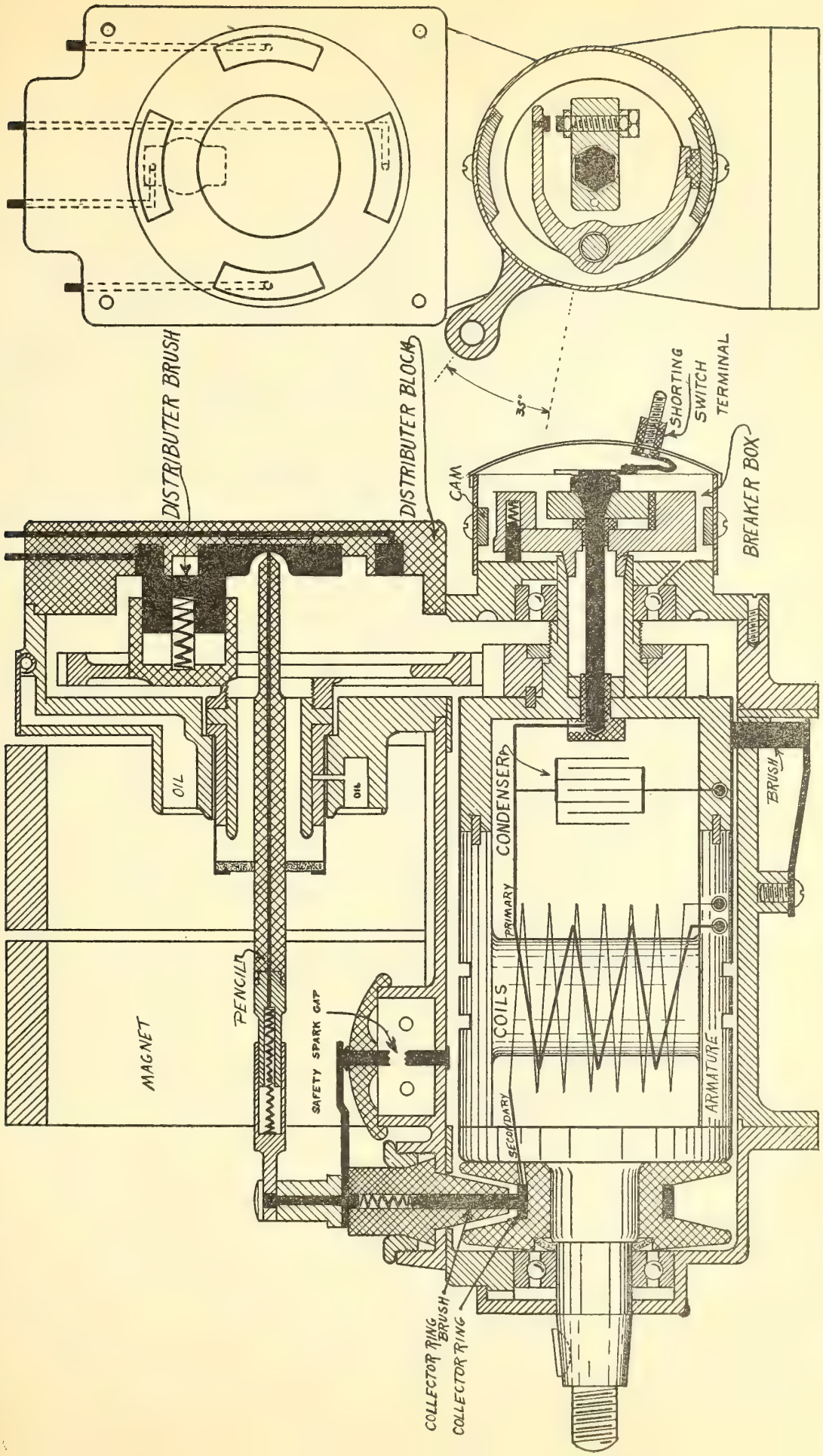
c - Timing - piston in position for full advance spark, distributor brush on correct segment, advance breaker box, breaker points just ready to separate, mesh gears, connect distributor segments to spark plugs in firing order of cylinders.

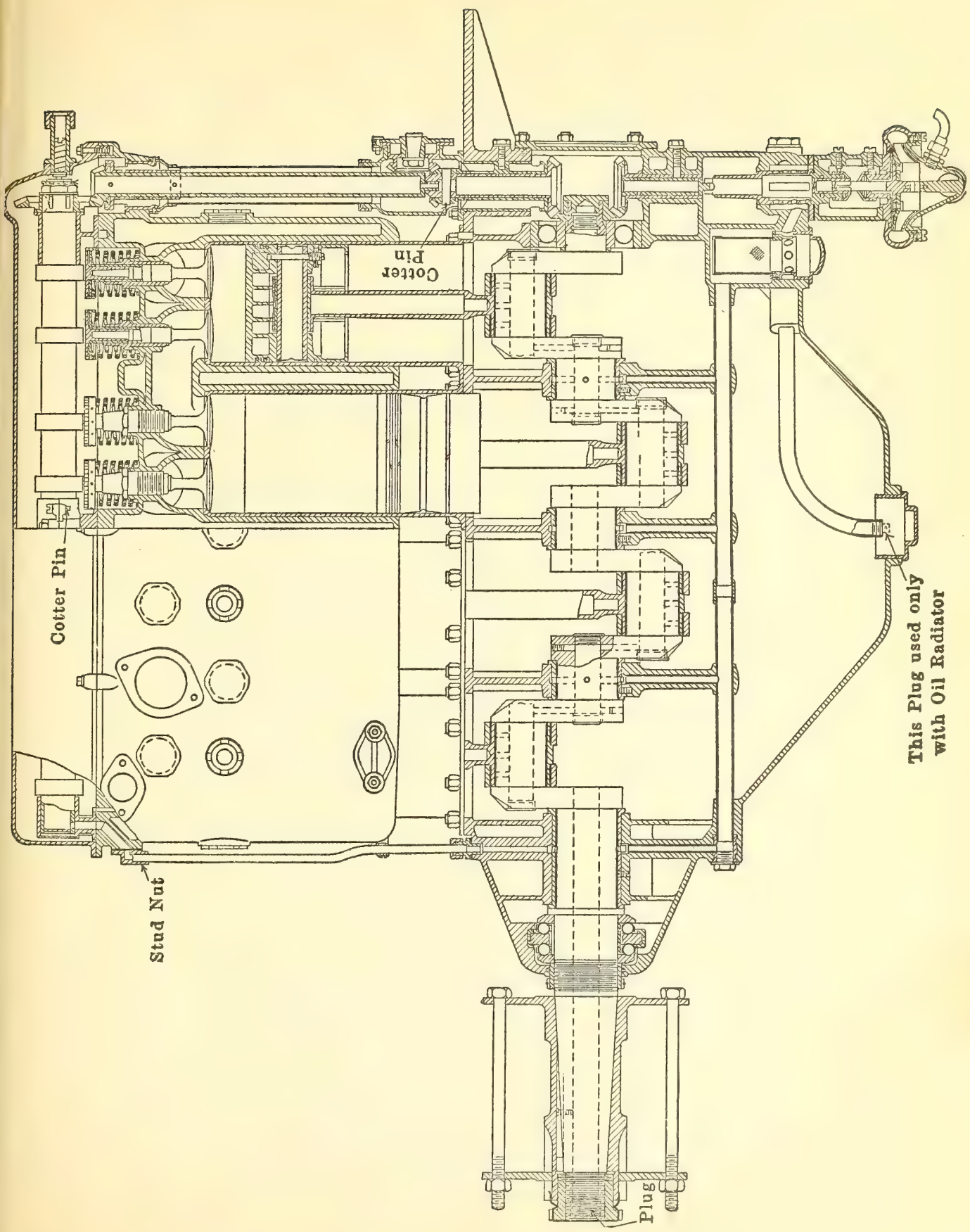
d - Synchronizing, making all breaker points separate at the same instant.


Dixie
CONDENSER
HIGH TENSION WINDING
LOW TENSION WINDING
LAMINATED IRON CORE
POLE EXTENSION
NON-MAGNETIC DISTANCE PIECE
POLE EXTENSION
PRIMARY WIRE


FIG 1


X
A
B
C
D
E
F
G
FIG 2


DISTRIBUTER BRUSH
DISTRIBUTER BLOCK
35°
SHORTING SWITCH TERMINAL
CAM
BREAKER BOX
OIL
OIL
CONDENSER
BRUSH
PRIMARY
COILS
PENCIL
SAFETY SPARK GAP
MAGNET
ARMATURE
SECONDARY
COLLECTOR RING BRUSH
COLLECTOR RING


Cotter Pin
Cotter Pin
Stud Nut
Plug
This Plug used only with Oil Radiator

T R O U B L E S H O O T I N G

1 - Must first know performance of engine when operating correctly

a - required r.p.m., from tachometer
b - normal cooling water temperature (leaving) 140° F.
c - Smooth, rapid acceleration and lack of vibration

2 - Locate base of trouble by systematic elimination of possible causes.

CLASSES OF TROUBLES:

a - Noisy action:-
1 - Worn bearings or excessive end play of crank shaft
2 - Worn piston, causing "piston slap"
3 - Worn or loose gears
4 - Valves not properly seating - loose gaskets
5 - Insufficient lubrication

b - Misfiring:-
1 - Valve not properly seated, improper tappet clearance
2 - Defective spark plugs or wiring
3 - Air leaks to inlet manifold or inlet valve stems
4 - Oil on magneto breaker or carbon deposit on distributor.

c - Overheating:-
1 - Insufficient cooling water
2 - Dirty radiator or closed hose connections
3 - Thin oil, dirty oil, broken oil lead, tight bearings
4 - Excessive carbon deposits in cylinder
5 - Rich mixture or retarded spark

d - Failure to start:-
1 - No fuel, no spark, improper valve timing
2 - Throttle too far open
3 - Too heavy cylinder priming
4 - Dirty spark plugs or gap not of correct width

e - Failure to stop:-
1 - Broken or loose wire to shorting switch
2 - Defective shorting switch
3 - Defective shorting connection in magneto
4 - Excessive carbon deposit in cylinder

f - Failure to throttle down:-
1 - Air leak to inlet valve or manifold
2 - Control rod to throttle broken or disconnected
3 - Throttle not closing (stop screw)
4 - Poor idling adjustment

APPENDIX K6.

Contains the following:

Copies of Syllabi of OBSERVATION DEPARTMENT

Furnished to Cadets on:

Cooperation of Airplanes with Artillery and Photography
Syllabus (8 pages)
Cooperation of Airplanes with Artillery (Complete)
Lecture notes (not furnished to cadets) (23 pages)
Miniature Artillery Observation Range (7 pages)
Typical Example of a Prearranged Shoot (7 pages)
Code Signal Card (1 page)
Map Reading (21 pages)
Pin-pointing and Map Problems (8 pages)

DEPARTMENT OF OBSERVATION
Syllabus of Course in
COOPERATION OF AIRPLANES WITH ARTILLERY

I. General Duties of the Air Service.

Assigned to the Army Corps Squadrons.

1. Reconnaissance.

2. Cooperation with Infantry (Contact Patrol).

3. Cooperation with Artillery.

Assigned to the Army or Army Group Squadrons. (Bombing and Battle Squadrons).

4. Pursuit and Combat.

5. Bombing.

6. Fighting on the Battlefield (with machine guns and bombs against infantry).

II. Field Artillery.

1. Types. a. Guns. b. Howitzers. c. Mortars.

2. Characteristics. a. Construction. b. Angle of Elevation. c. Muzzle-velocity. d. Trajectory. e. Charges. f. Kinds of fire. g. Time of flight of projectile.

3. Projectiles used. a. Types, (High-explosive, sharpnel, armor-piercing, common gas, liquid fire.) b. Fusing (Time, percussion).

4. Errors of the piece. a. 100% Zone of Dispersion. b. Normal atmospheric conditions. c. Error of the day or error of the moment.

III. Duties of the Artillery.

1. Barrage fire.

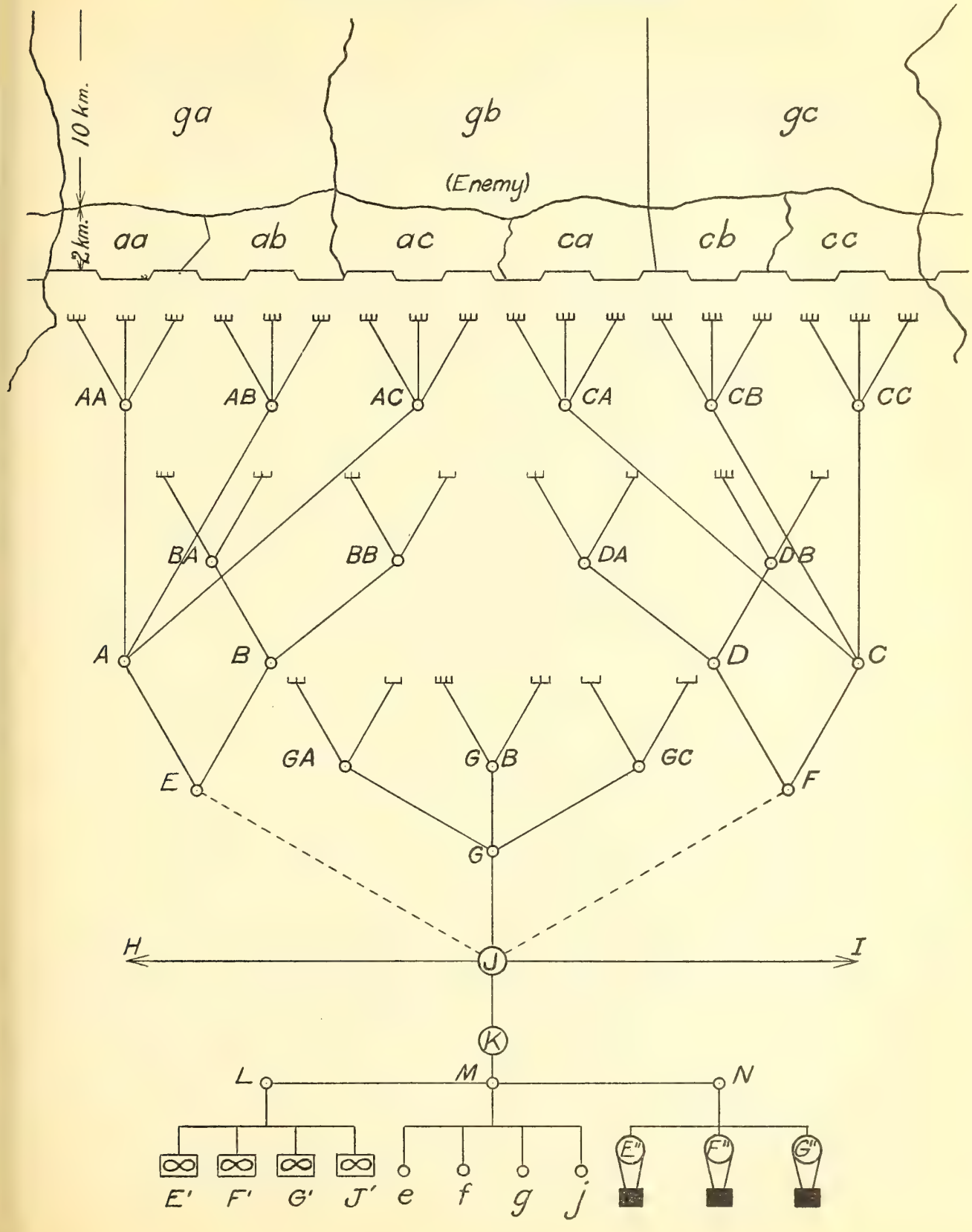
2. Counter-battery fire.

3. Bombardment.

IV. French Artillery.

1. Classification. a. Divisional artillery. b. Corps artillery. c. Army artillery.

DIAGRAM SHOWING
THE
ORGANIZATION OF A FRENCH ARMY CORPS
ARTILLERY AND AIR SECTORS



Explanation of the Diagram
showing the
Organization of a French Army Corps
Artillery and Air Sectors

ZONES OF ENEMY TERRITORY.

aa, ab, ac = Zones of enemy territory into which the First Division fires.
ca, cb, cc = Zones of enemy territory into which the Second Division fires.
ga, gb, gc = Zones of enemy territory into which the Corps Artillery fires.

DIVISIONAL ARTILLERY.

AA, AB, AC = H.Q. C.O. of the groups of First Divisional Gun Batteries.
CA, CB, CC = H.Q. C.O. of the groups of Second Divisional Gun Batteries.
(The Commanding Officer of each of the above groups is a Major. He has under him a Captain in charge of each of the batteries of his group and there is generally a Lieutenant in charge of each of the guns of the battery).
BA, BB = H.Q. C.O. of the groups of First Divisional Howitzer and Mortar Batteries.
DA, DB = H.Q. C.O. of the groups of Second Divisional Howitzer and Mortar Batteries.
(The Commanding Officers here are exactly the same as those given above for the Divisional Gun Batteries).
A = H.Q. C.O. of the First Divisional Guns.
C = H.Q. C.O. of the Second Divisional Guns.
B = H.Q. C.O. of the First Divisional Howitzers and Mortars.
D = H.Q. C.O. of the Second Divisional Howitzers and Mortars.
(The rank of the four officers above (viz., A, C, B, D) is Lieutenant Colonel).
E = H.Q. C.O. of the First Division. (Rank - Colonel).
F = H.Q. C.O. of the Second Division. (Rank - Colonel).

CORPS ARTILLERY.

GA, GB. GC = H.Q. C.O. of the groups of Batteries of Long Range Artillery, or Corps Artillery. (Rank - Uncertain).
G = H.Q. C.O. of the Corps Artillery. Duties tactical. (Rank - Uncertain).
J = H.Q. C.O. of the Corps (i.e. of Corps Artillery Organization). Duties strategical. Gives orders to G and munitions E and F. (Rank - General).
H, I = H.Q. C.O. of adjacent Corps. (Rank same as J).
(The orders for the Divisional Artillery come, not from the artillery officer, J, but from the commander of the entire Army Corps, because the action of the light artillery is so closely connected with the action of all other units in the corps, particularly that of the infantry.)

AIR SECTOR

E', F', G' = Air Squadrons assigned to the artillery commands E, F, and G, respectively.
J' = Air Squadron assigned to the general, J, as a base Squadron.
E", F", G" = Balloons assigned to the artillery commands, E, F and G, respectively.

e, f, g = Photographic Sections assigned to the artillery commands, E, F and G, respectively.
j = Photographic Section assigned to the general, J, as a base Section.

K = Air Commander, Chief of the Air Sector, and advisor to the general J. K has under him L, M and N in charge of their respective departments.
L = Aviation Officer, in charge of the Air Squadrons.
M = Information Officer, in charge of the Photographic Sections.
N = Balloon Officer, in charge of the Balloons.

LARGER UNITS.

The next larger unit to the army corps is the army, containing two or more corps. A still larger unit, embracing two or more armies, is the army group. It is to be remembered that this diagram illustrates but one of the crops in an army and that there may be many armies facing the enemy front, side by side, each two or three of which will be classed together as an army group.

2. Organization of a French Army Corps (Artillery and Air Sectors). See diagram and explanation.

V. Methods of Identification and Communication.

1. Identification panels. a. Divisional artillery. b. Corps artillery.

2. Signalling from artillery to airplane. a. Ground strips (with Identification panel). b. Window-shutter panels (panneaux). c. Projectors. d. Wireless.

3. Signalling from airplane to artillery. a. Wireless. b. Projectors. c. Very's lights. d. Smoke bombs. e. Circling signals. f. Message bags.

4. Signal Codes. a. Use of the International Morse Code. (Code for adjustment of fire, Service signals, Single letters, Two-letter groups, Groups of two letters and one numeral, Three-letter groups, Two-numeral groups, Three-numeral groups, Four- to eight-numeral groups, Messages in Morse code in complete words). b. Codes used by other methods of signalling.

VI. Conduction of shoots.

1. Methods of firing. a. By piece. b. By salvo. c. By volley.

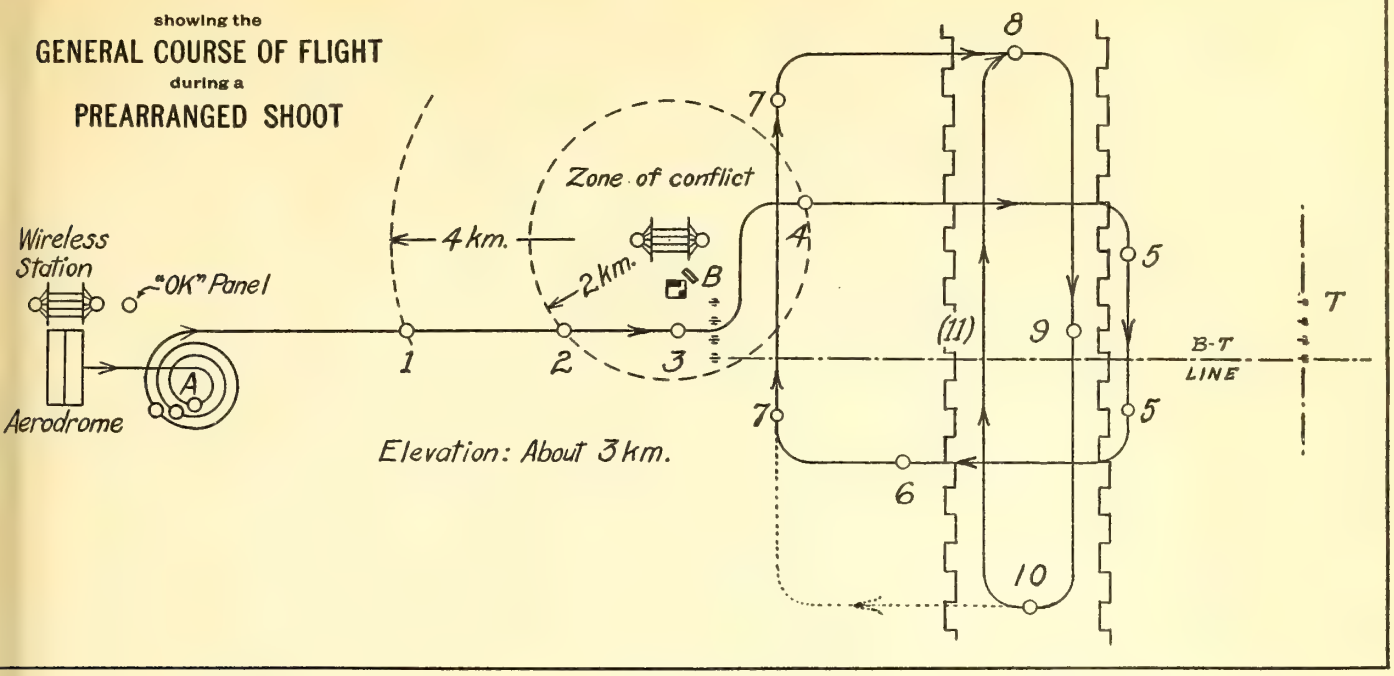
2. Method of reporting single bursts. a. Position of battery known. b. Position of battery unknown. c. General rules for reporting.

3. Method of reporting salvo fire. a. Rules for reporting. b. Variations of salvo fire.

4. Kinds of shoots. a. Prearranged shoots. b. Impromptu shoots.

5. Method of flying in a Prearranged shoot. a. Diagram. b. Explanation.

DIAGRAM
showing the
GENERAL COURSE OF FLIGHT
during a
PREARRANGED SHOOT



DEPARTMENT OF OBSERVATION

Syllabus of Course in

INTERPRETATION OF AERIAL PHOTOGRAPHS

I. Prime Importance of Photography.

1. Sources of Information.

a. Personal observation.

b. Patrol reports.

c. Prisoners' reports.

d. Sounds and flashes.

e. Photography.

2. Advantages of Photography.

a. Reliability of information obtained.

b. Detail recorded.

C. Permanency of records.

II. Classification of Photographs.

1. By Angle of Exposure.

a. Oblique photographs.

b. Vertical photographs.

2. By Purpose of Exposure.

a. Definite area or position.

b. Line photographs.

c. Stereoscopic photographs.

III. Prominent Features in Photographs.

1. Trenches.

a. German trench organization.

b. Appearance of main, communicating and dummy trenches.

2. Locations of Firing Pieces.

a. Indications of battery position.

b. Indications of machine gun position.

c. Indications of trench-mortar position.

3. Openings to Underground Passages.

a. Dug-out entrances.

b. Mine-shaft entrances.

4. Lines of Communication.

a. Railways and tramways; roads.

b. Paths and tracks.

c. Buried cables and air lines.

5. Barbed-Wire Entanglements.

a. Appearance.

b. Visibility of gaps.

IV. Rules Observed in Interpreting.

1. Auxiliary Map. 2. Direction of Light. 3. Method in Search.

4. Concentration. 5. Independence of Evidence. 6. Comparison. 7. Annotating.

Appendix

Five Lectures
on
COOPERATION OF AIRPLANES WITH ARTILLERY.

Given at the U.S.S.M.A., Berkeley, Cal. Jan. 1919.

There are six General Duties of the Air Service as follows:-

1. Reconnaissance. An aerial reconnaissance is a flight over enemy territory with a view to obtaining as much information as possible that may be of value to your own command. The reconnaissance observer is used also to test out our own camouflage.

2. Cooperation with Infantry (or Contact Patrol). Assisting in transmission of information between the advancing infantry and staff headquarters and also the artillery.

3. Cooperation with Artillery. Discovering and locating new targets and observing and reporting fire of artillery batteries.

These are the duties assigned to the Army Corps squadrons or the Observation squadrons, as they are sometimes called.

4. Pursuit and Combat with enemy aircraft to prevent their operations over our own lines also to accompany friendly planes of a heavier type, eg., reconnaissance planes, bombers, etc.

5. Bombing vital points of the enemy's works generally beyond the range of our own artillery.

6. Fighting on the Battlefield with bombs and machine guns against personnel on the ground. Developed from the work of Cooperation with Infantry.

These are the duties assigned to the Army or Army Group Squadrons, sometimes called the Bombing and Battle squadrons.

Field Artillery.

There are three fundamental types of pieces, (a) guns, (b) howitzers, (c) mortars. They differ in the following characteristics. (1) Construction: The caliber of a pieve is its smallest bore diameter of the distance between opposite "lands". A land is a projection between the grooves of the rifling. (Fig. 1). Modern guns in the Field Artillery range in caliber from 75mm to 340mm (3" to 13"), howitzers from 15 5 mm to 520mm (6" to 20"), mortars from 220mm to 293mm (6" to 10"). Caliber is used as a unit of measurement for the other parts of the piece, principally the length. Modern guns are about 50 calibers long, howitzers about 20 and mortars about 10. All modern artillery is rifled, ie., a series of spiral grooves is cut down the bore in a right hand screw direction. The twist or pitch is not constant thruout the length. In guns it increases gradually from 1 turn in 50 calibers of length at the breech to about 1 turn in 25 calibers when two calibers from the muzzle and then continues uniformly. The steel projectile is slightly smaller than the bore of the piece (to reduce erosion) and there is attached to its base one or more copper rotating bands slightly larger than the caliber. The rotating band is forced into the grooves of the rifling and a revolving motion of about 8,000 rpm is imparted to the projectile. This keeps the nose foremost in flight. The theoretical rotating speed may be calculated from the known muzzle velocity and the pitch of the rifling, but there will always be a large amount of slip.

our own camouflage.

3. Co-operation with Artillery. Discovering and locating new targets and observing and reporting fire of our own batteries.

Observation squadrons, as they are sometimes called.

4. Photographing the enemy's trenches, their communications, their own lines also to accurately determine the position of a hostile aeroplane, etc.

5. Bombing vital points of the enemy's rear, such as railway stations, ammunition depots, bombing of our own artillery.

6. Fighting on the battlefield with bombs and machine guns.

These are the duties assigned to the Army or Army Group

(fig. 1). Modern guns in the Field Artillery range in calibre from 75mm to 10"). Calibre is used as a unit of measurement for rifled, ie., a series of spiral grooves is cut down the bore in a right hand direction. The twist or pitch is not constant throughout the length. It turns it increases gradually from 1 turn in 30 calibres of length at the breech to 1 turn in 25 calibres when two calibres from the muzzle. Modern guns are almost uniformly. The steel projectile is slightly smaller than the bore of the piece (to reduce erosion) and there is attached to its base one or more

The theoretical retaining speed may be calculated from the known muzzle velocity of the rifling, but there will always be a large

Guns are the longer and they are generally the lighter built and more mobile pieces. The smaller ones are built on field carriages and the larger onesare often built on railway carriages. Some Howitzers are built on wheel carriages but the largest are always built on casemented foundations. Mortars are practically always built over pits on semi-permanent foundations.

(2) Angle of Elevation;- On account of their comparative length and mounting, guns are not ordinarily used at elevations over 15° or 20° above the horizontal. However, the split-tail carriages makes it possible to elevate guns up to 40° thus taking over many of the duties of the howitzers for long range work. Howitzers will elevate up to 45° and mortars up to 65° or more. Howitzers and mortars are not ordinarily used at low elevations. The anti-aircraft gun is a special case.

(3) Muzzle Velocity (M.V.):- Due to the greater length of barrel in the case of guns, the expanding gasses of the ignited charge have a longer confined distance in which to impart their energy to the projectile. Consequently, the velocity of the projectile as it leaves the muzzle of the piece, muzzle velocity, is greater in the case of guns than howitzers or mortars. Average values are 3,000, 15 00 and 85 0 feet per second respectively.

(4) Trajectory:- The projection of the path of the projectile during f light upon a vertical plane parallel to the direction of fire is the trajectory. Theoretically, this is a parabola and the maximum range obtained is with an initial angle of 45° (Angle of Elevation). Due to its comparatively low angle of elevation and high muzzle velocit y , the trajectory for a gun will be long and flat. For a howitzer, and more pronouncedly for a mortar, the trajectory will be higher, more curved and shorter, as shown in the figure. (Fig. 2). Since a mortar is elevated over 45°, its range is decreased by increasing the angle of elevation. Dut to the clockwise rotation of the shell, the resistance of the air and the force of gravity cause the path to curve slightly to the right, i.e., the shell does not travel exactly in the line in which the piece is pointed. The discrepancy, measured at the point of impact, is called the drift.

(5) Charges. Ammunition for guns up to 155mm comes in a brass case with a percussion cap for igniting, filled with the powder charge and with the projectile fixed in the muzzle end. This is exactly the same as small arms ammunition (except for size) and is called Fixed Ammunition. For the larger guns and for all howitzers and mortars, the projectile and powder charge come separate. This is called Separate Ammunition. A gun has, as a rule, a charge of but one weight of powder to go with its projectile. (The smaller guns, when engaged in barrage fire, have this amount reduced, as we shall see later). This is called a Fixed Charge; the range is changed by chaging the angle pf elevation of the piece. Howitzers and mortars change their range both by changing the angle of elevation of the piece and by changing the weight of powder in the propelling charge. These are called Varied Charges. With each charge, there is a certain zone or strip of terr itory that can be swept over by changing the elevation of the piece thru a certain arc. The next charge will sweep over the next zone by changing the elevation of the piece thru the same arc. Adjacent zones, of course, overlap slightly. This is illustrated in Fig. 3 and Fig. 4. It should be noted that, with the mortar, the shortest range is gotten with the highest elevation. Howitzers have 5 different charges and hence 5 zones, motars 9. The highest number indicates the heaviest charge. A Howitzer uses but one weight projectile for all charges but a mortar uses a lighter projectile with the 8th and 9th charges (than with the first 7) to further increase the range.

(6) Kinds of Fire;- Fire from guns at the lower elevations and using full service charges is called direct fire. For barrage fire, a Reduced Charge is used and it is then called indirect fire. All fire from howitzers and mortars is called curved fire, the highest, high angle fire. The original and obvious meaning of Direct Fire is where the target can be seen and aimed at directly by the gun pointer. Similarly, Indirect Fire, is where the setting is made from reports and calculations.

(7) The Time of Flight of a projectile depends upon its path (trajectory) and the speed with which it travels along that path. This is independent of atmospheric conditions, altho the range is not. To fire 10 kilometers, a 300mm howitzer must be elevated higher than a 300mm gun for the same range . Hence the distance along this trajectory or the path traveled over is greater for the howitzer and, in addition, the rate of travel, or speed, is slower. The time required for the projectile from the howitzer to reach its objective will be 55 seconds while from the gun it will be only 15 seconds. If a motar were used, (mortars are not used fo so great a range, however), the projectile would require even longer time for its flight than if fired from a howitzer. It is very important that the observer know the time of flight he is to expect f rom the battery whose fire he is assigned to observe. He cannot watch the target closely for a very long interval of time. He sends the signal to fire (by radio), watches for the flash of the gun at his own battery, then allows for the Time of Flight (perhaps by the aid of a stop-watch) and, at the proper instant, concentrates all his attention on the target . He sees the "burst" , visualizes it and locates it with the aid of a photograph which he has been furnished.

Projectiles.

The following types of projectiles are in use with modern artillery, viz., High-explosives, Shrapnel, Common, Armor-piercing, Gas and Liquid fire. H.E. is used from all types of pieces against material and artificial cover but not against personnel . Its case is one piece and bursts on percussion. Shrapnel is used against personnel and by guns only because of the low remaining velocity and the high angle of descent of a shell from other pieces. (Fig. 5). Shrapnel has a two-piece case filled with a bursting charge at the rear and bullets near the nose. At burst, the bullets are thrown out thru a cone, called the cone of dispersion, the angle of which is fixed and determined by the construction of the shell and the rotational speed. Common shells may or may not be filled with a bursting charge. The name embraces types not otherwise classified. Armor-piercing shells are made specially strong and are usually constructed with a very pointed, hardened steel cap over the nose, which enables them to pierce armor. Generally their fusing is such as to allow penetration before exploding. Gas shells are filled with a liquid (chlorine or mustard gas) which scatters over the ground on burst and quickly vaporizes, forming a gas heavy and dense enough to remain close to the ground. Liquid fire shells are filled with an inflammible fluid which bursts into flames upon rupture of the shell. They are used for incendiary purposes. High-explosive-shrapnel shells are a combination of the two forms indicated. There is a head containing the high explosive which continues flight after the burst of the shrapnel bullets behind it. The combination is effective where it is desired to destroy personnel and artificial cover simultaneously and also against barbed-wire entanglements.

There are two methods of fusing a shell to regulate its burst, time fusing and percussion fusing. With time fusing, the burst will occur at the end of a fixed interval of time, starting from the instant that the shell leaves the muzzle of the piece. With percussion fusing, the burst may be made to occur instantaneously with or at some definite time interval after hitting the objective.

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... inflammable fluid which bursts into flame upon ruptures of the
shell. They are used for ... any purposes. Thermo-plastic ...
are a combination of the two forms indicated. There is a ... combining
... which combines l...
... combination is effective where it is ... ...
artificial cover ... and also ...

... ... fusing. With time fusing, the burst ...
a fixed interval of time, ... from the instant that the shell leaves the
muzzle of the piece. With percussion fusing, the burst may be ...

These give instantaneous and delayed-action percussion respectively.

Errors of the Piece.

All conditions remaining constant, including the setting of the piece, all the shots will not fall exactly at the same spot but they will fall over an elliptical area on the ground. This phenemonon is called dispersion and the elliptical area, the Zone of Dispersion or, more specifically, the 100% zone of dispersion. The causes for this may be enumerated as follows:-

1. Personal errors in loading, aiming and setting.
2. Condition of the piece.
3. Action of the carriage (jump, braking, etc.)
4. Condition and uniformity of the projectiles.
5. Condition and uniformity of the powder charge.
6. In time fire, the action of the fuse.

If a large number of projectiles are fired, they will not all travel along the same path thru the air, the theoretical trajectory, but the paths of all may be embraced by a conical sheath whose axis will be the true theoretical trajectory as shown in Fig. 6. The intersection of this sheath with ground will be an ellipse and 100% of all the shots will fall within this elliptical area.. The shape of this ellipse will depend upon the nature of the ground and also upon the range since the longer the trajectory, the greater will the divergence become. Due to the more nearly vertical angle of descent for a howitzer and still more for a mortar, this zone will be much wider in proportion to its length than for a gun. If the ground slopes toward the piece, the zone will be shortened, whereas a reverse slope, especially for a low, flat trajectory, will lengthen it very decidedly. Fig. 7 shows this zone, the major axis being in the direction in which the piece is firing, or in the axis of range. If this ellipse is divided into 8 strips or belts of equal width measured along the major axis, the percentage of shells that will fall in each strip or small zne will be as indicated in the figure. The two zones on either side of the center together take up one-fourth of the entire length of the ellipse and they are often spoken of as the 50% zone. Example: 155mm gun at 10km range, ellipse is 300m x 40m.

Error of the Day or Error of the Moment.

The 1005 zone has been considered when all conditions were fixed and constant. It is the purpose of the Battery Commander to set his piece so that the center of this zone will fall on the objective and he must then "trust to luck" that some of ths shots will be effective. Now the "shooting" of a piece from day to day is affected by the prevailing atmospheric conditions. Standard atmospheric conditions are said to exist when the temperature of the air is 60° F, the barometric pressure, or air density, is 30 inches of mercury and no wind is blowing. For any other conditions, there is a correction in the range or deflection setting or both which is applied to all calculated settings. This is called the error of the day or, more precisely the Error of the Moment since, actually, it does change from moment to moment. An increase in the atmospheric pressure will increase the density of the air and also the resistance to the projectile passing thru it thus decreasing the range for a fixed setting of the piece. A decrease in the atmospheric pressure will do the opposite. An increase in temperature will tend to decrease the density of the air and hence will increase the range. A fall in the temperature will have the opposite effect. A wind in the direction the projectile is traveling will increase the range while a wind against the projectile will decrease the range, A wind from the right will turn all the shells to the left, while a wind from the left will turn them all to the right.

The 1030 may not have been considered when all conditions were fixed and

For a concrete example, take a 75mm gun set at 5 km. range. A change in temperature of 30° F will change the range 150 m; a change in pressure of 1" of mercury will change the range 50 m and a 25 mph wind in the line of the trajectory will change the range 150 m. If these are cumulative errors (i. e., all in the same direction), the effect might be a change of 350 m. in range. On the other hand, they might be compensating errors, i.e., tend to balance each other. A wind directly across the trajectory will affect the deflection only 1/4 to 1/2 as much as the same wind in the line of the trajectory will affect the range. Advantage is taken of this fact to reserve enfilade fire for a windy day, not that better work can be done on such days, but that this particular work can be done to less disadvantage than any other work and, of course, every day must be utilized.

The changes noted above should, more precisely, be spoken of as changes in the mean range and mean deflection. In other words, the error of the day will shift the 100% zone as a whole but will not change its size or shape appreciably. In order to more quickly determine this error and hence the correct setting for a target in the enemy territory, it is general practice for a battery of small caliber pieces to register No. 1 gun on a trial target. This is a target (preferably at about the same range as the real target) which can be seen by a terrestrial or, at least, by a balloon observer. When the trial target is hit or bracketed, the piece is trained thru the required azimuth angle and the other pieces set for parallel fire and the same range. Each battery will have a number of these trial targets and a daily record will be kept of the required setting for a hit on each. This method of ranging is called Registration and the evident purpose is to enable the battery commander to open effective fire on any point in his assigned territory in the shortest possible time. The value of the surprise element is considered worth the ammunition spent on the trial target. Of course, all shells fired at the trial target are wasted, so far as effect on the enemy is concerned so, for the larger caliber pieces, where the ammunition is more expensive, it is customary to range No. 1 gun on the real target directly and then set the other pieces from the setting of No. 1.

Duties of the Artillery.

The three primary duties of the artillery are, Barrage Fire, Counter-battery Fire, and Bombardment. It has been said that the artillery subdues, - the infantry occupies. At any rate, in modern warfare, any successful infantry action is highly dependent upon efficient artillery preparation. Effective artillery work is dependent upon good observation from the air. So then, we may say that any advance depends upon good observation during the days immediately preceding it.

Barrage fire may be defined as fire in which the projectiles fall in the form of a curtain of shells. It may be used to prevent attack on the part of enemy infantry, to cut of f reinforcements and, by means of the creeping form of barrage to clear the way for and accompany the advance of friendly infantry. When these curtains are laid down in a line in front of or behind the enemy trench, they are known as line barrages. Laid down at right angles to a trench position, flanking the same, it would be called a flank barrage. Should a combination of line and flank barrages box an enemy position, the fire would be termed a box barrage. This is illustrated in Fig. 8.

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Then these curtains are laid down in a line in front of or behind the position, they are known as line barrages.

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All pieces may be used in barrage fire, but those chiefly employed are the 75's with reduced charges and the light howitzers (115mm). No ranging, of course, would be possible during barrage fire, as the shells of any particular battery would simply be lost in the shower. However, important trench points would, in best practise, if there were time beforehand, have been previously registered.

Counter-battery fire is fire on enemy batteries and it is here that airplane observation finds its greatest opportunity for efficient and essential cooperation,- not so much in neutralization fire as in fire for destruction. Neutralization fire has for its object, the temporary silencing of enemy batteries seen suddenly active during an attack and is directed primarily against the battery's personnel. Generally, time cannot be taken for ranging, this being known with sufficient accuracy from previous registration or from map locations. Medium pieces are used and gas shells and shrapnel when directed against the personnel particularly. Fire for destruction must be constantly observed by the best means available until the desired demolition is attained. Heavy guns and heavy howitzers are used for this work.

Bombardment embraces all fire not already classified and is carried out by the very heaviest of all types of pieces. Heavy guns are used against vertical targets and heavy howitzers against cover. Here too airplane observation is very essential, in fact, with the heaviest long range pieces, hardly a shot is fired without an observer.

French Artillery

Classification according to Sizes and Duties.

It is the French practice to call their Lighter pieces Divisional Artillery, the Medium pieces Corps Artillery and the Heaviest pieces Army Artillery. There is no separate command for the Army Artillery inthe field but any particular part of it is allotted to the corps at the point where it is assigned to work. Ordinarily, there is not enough Army Artillery for each particular Corps along the front, but it is shifted from place to place where it will be most effective. To the Artillery allotted to the Division, naturally falls the prime duty of barrage fire while counter-battery work is the first duty of the Corps Artillery and bombardment is the principal occupation of the heavy Army Artillery pieces.

In the Divisional Artillery are the 75mm field guns whose duties are, in general barrage fire, wire-cutting, night firing to prevent reconstruction and destruction of enemy positions within range. Here are classified also the 150mm field howitzers and the lightest (220-270 mm) mortars which are called upon to destroy fortified works assigned to the Divisional Artillery, fire on slopes and with gas shells on troops in cover such as woods. They also aid in barrage fire.

The Corps Artillery embraces principally the medium guns (100-155mm) and is employed in counter-battery work, both neutralization and destruction, night firing on contonments and supply lines and also in barrage fire on occasion.

The Army Artillery includes the 140 to 340mm guns, the 370 to 520mm howitzers and the 270 to 293mm mortars and is used by the different army corps in the bombardment and destruction of forts and concrete works and in all long range fire such as on cantonments, supply lines and supply centers and ammunition dumps.

Classification according to Organization in the Field.

In the field, we will find the Divisional Artillery group (two or more per army corps) and the Corps Artillery, the Army Artillery, when present, being allotted to this last command. We will now consider more in detail the organization of the artillery and air service in a French Army Corps. The zones of enemy territory allotted to different groups of artillery have already been mentioned. They are

French artillery

Identification according to sizes and units.

In reel, with the heaviest long range pieces, hardly a shot is fired without
its allotted to the corps at the point where it is assigned to work. Ordinarily,
to command for the Army artillery in the field but any particular unit of it
will be most effective.

[illegible] wire-cutting, night firing to prevent reconstruction and [illegible]
forces assigned to the divisional artillery, fire on bridges and with the smaller
[illegible] artillery, [illegible] destroying the main [illegible]
on communications and supply lines and also in barrage fire on occasion.

The Army artillery includes the 240 to 280mm guns, the 270 to 320mm howitzers
and the 270 to 370mm mortars and is used by the different army corps for counter-
batteries, supply lines and supply convoys and ammunition dumps.

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Concealment embraces all fire not already classified and is carried out by the
heaviest of all types of pieces. Heavy guns are used against vertical [illegible]
[illegible]

defined by any natural boundaries which exist on the ground such as rivers, fences, railroadsl roads, etc. Those from the enemy front to about 2 km back are allotted to the two (ormore) divisions of zones are assinged to the corps artillery. The The artillery map carried by the observer depicts these zones in different colors, for each of which will be indicated in the same color (a circle about $\frac{1}{2}$ km in diameter) the approximate location of the group or battery firing into that zone or area. The corps front will be somewhere near a kilometer and a hlaf in length and the arrangement of the artillery before it will be better understood from a study of the following diagram and explanation. It must be understood that this is a diagramatic representation made regular and symetrical in order that it may be more easily seen and grasped. Actually, there may not be the same number of zones or battery groups indicated and they will be located according to the terrain and shape of the front. The lines on the diagram represent lines of communication.

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Explanation of the Diagram
showing the
Organization of a French Army Corps
Artillery and Air Sectors

ZONES OF ENEMY TERRITORY

aa, ab, ac - Zones of enemy territory into which the First Division fires.
ca, cb, cc - Zones of enemy territory into which the Second Division fires.
ga, gb, gc - Zones of enemy territory into which the Corps Artillery fires.

DIVISIONAL ARTILLERY.

AA, AB, AC - H.Q. C.O. of the groups of First Divisional Gun Batteries.
CA, CB, CC - H.Q. C.O. of the groups of Second Divisional Gun Batteries.
(The Commanding Officer of each of the above groups is a Major. He has under him a Captain in charge of each of the batteries of his group and there is generally a Lieutenant in charge of each of the guns of the battery).
BA, BB - H.Q. C.O. of the groups of First Divisional Howitzer and Mortar Batteries.
DA, DB - H.Q. C.O. of the groups of Second Divisional Howitzer and Mortar Batteries.

(The Commanding Officers here are exactly the same as those given above for the Divisional Gun Batteries.)
A - H.Q. C.O. of the First Divisional Guns.
C - H.Q. C. O. of the Second Divisional Guns.
B - H.Q. C.O. of the First Divisional Howtizers and Mortars.
D - H.Q. C.O. of the Second Divisional Howitzers and Mortars.
(The rank of the four officers above (viz., A? C. B. D) is Lieutenant Colonel).
E - H.Q. C.O. of the First Division. (Rank - Colonel).
F - H.Q. C.O. of the Second Division (Rank - Colonel).

CORPS ARTILLERY.

GA, GB, GC - H.Q. C.O. of the groups of Batteries of Long Range Artillery, or Corps Artillery. (Rank - Uncertain).
G - H.Q. C.O. of the Corps Artillery. Duties tactical. (Rank - Uncertain).
J - H.Q. C.O. of the Corps (i.e. of Corps Artillery Organization). Duties strategical. Gives orders to G and munitions E and F. (Rank - General)
H, I - H.Q. C.O. of adjacent Corps. (Rank same as J).
(The orders for the Divisional Artillery come, not from the artillery officer, J, but from the commander of the entire Army Corps, because the action of the light artillery is so closely connecte with the action of all other units in the coprs, particularly that of the infantry.

AIR SECTOR

E', F', G' - Air Squadrons assigned to the artillery commands E, F, and G. respectively.

J' - Air Squadron assigned to the general, J, as a base Squadron.
E", F", G" - Balloons assigned to the artillery commands, E, F and G, respectively.
e, f, g - Photographic Sections assigned to the artillery commands, E, F and G, respectively.
j - Photographic Section assigned to the general, J, as a base Section.

K - Air Commander, Chief of the Air Sector, and advisor to the general J. K has under him L, M and N in charge of their respective departments.
L - Aviation Officer, in charge of the Air Squadrons.
M - Information Officer, in charge of the Photographic Sections.
N - Balloon Officer, in charge of the Balloons.

LARGER UNITS.

The next larger unit to the army corps is the army, containing two or more corps. A still larger unit, embracing two or more armies, is the army group. It is to be rememberred that this diagram illustrates but one of the corps in an army and that there may be many armies facing the enemy front, side by side, each two or three of which will be classed together as an army group.

Methods of Identification and Communication.

We will now take up the different means of communication between the air and the ground, considering, first, the method of identification of friendly battery positions by means of the Identification Panel. These panels are pieces of cloth (oil-cloth or canvas) three meters on a side, square in the case of divisional artillery, diamond shaped (with diagonals in the ratio of 2 to 3) in the case of the heavier, or corps, artillery. Each group or subgroup (Battery) is supplied with one of these panels in white for ordinary use and one in black for use in snow. It is supplied also with three small squares or diamonds of blakc (or white for snow) cloth one meter on a side. Each battery is assigned an arrangement of one or more of these small pieces on the large panel which mark identifies that command. There is a possibility of approximately forty different combinations using one, two or three of the smaller peices. See Fig. 9.

Signalling from the Artillery to the Airplane.

The most important means of signalling to the air from the ground is by means of white strips of cloth, called ground strips, placed near the identification panel. Each signalling station has three rectangular strips of white (black for use in snow) 1 m by 3 m with wooden battens on either end to facilitate handling. Messages are formed by the relative position of one or more of these strips with respect to each other and to the identification panel as a base. See Fig. 10 and the Department Code Card. On the card, the panel is shown blank, i.e., without any identification markings. These messages are displayed on a dark colored patch of ground, if available, and preferably one sloping toward the observer. It should be noted that, according to the French Manual, these messages, as shown on the card, are placed so as to be read looking from the rear of the battery in the direction of the target; or, in other words, the observer will ordinarily see the messages upside down. A corporal and two men will be detailed to operate all signalling apparatus located in the vicinity of every signalling station and to remove them on the approach of enemy aircraft.

Only a limited number of short messages can be sent by the ground strip method. For longer messages or ones not covered by this code, the window-shutter panel (Panneau a persienne) is very important. This is made up of 7 strips of cloth, 1.5 m x 0.4 m laid side by side so that, when open, it forms a rectangle of white, 1.5 m x 2.8 m. Each of these strips is arranged to fold half over on itself along a line parallel to its 1.5 m dimension. The set is connected up by a system of strings, springs and levers, all seven working together, and normally held folded. The under side is a dull neutral or khaki tint not visible from the air, the upper side is white. Thus, by pulling a lever a short distance, a rectable of white may be made to appear and disappear instantaneously. This is a visual method of telegraphing by Morse code (dots and dashes) and it may be used up to about 5 words per minute. Each one of the ground strip messages has a Morse equivalent which may be sent by this (or other) means. The message is generally a repeated character (eg. a series of 2's) which is sent until seen and acknowledged by the observor.

Another method of visual signalling is by means of projectors or large searchlights, 35 to 90 cm. in diameter. They are used principally to answer observers' signals and to call his attention to signals by other means. When provided with shutters, the Morse code may be sent. One man is required to direct the light toward the observer while a second works the shutter. They are not good on a bright, clear day.

The use of wireless from ground to air is limited by the want of development of a capable receiving set on the airplane. At present, only a few machines around important headquarters are so equipped.

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important developments are so equipped.

Signalling from the Airplane to the Artillery.

At the beginning of the war (1914) the best means of signalling from the observer to the artillery was by means of Very's Lights, supplemented, perhaps, by message bags. These lights are shot from a Very's pistol, a brass pistol of large bore and short barrel. The cartridges give out colored lights or "star-shells" - red, green or white - bursting. of course, the number of signals possible with this method are limited both by the number of colors easily distinguishable and by the capacity of the cockpit for ammunition. Frequently the observer would run out of ammunition during a shoot and would have to resort to Circling Signals. For example, a circle to the right might mean the same as a green light, etc.

The next development was a small projector or searchlight used by the observer. These are, of course, much smaller than the projectors used on the ground, being perhaps 24 cm. in diameter. They are arranged with a pistol grip and a shutter operated by the trigger. The source of energy is a battery, or small generator. At night these may be seen as far as 3 to 10 km.; in the daytime from 1.5 to k km. In the case of any means of visual signalling, the efficiency is impaired by distance, sunlight, clouds and fog, and the necessity of continually directing the light toward the receiver.

The latest and most satisfactory development is radio or wireless and this is now used in work with the artillery practically to the exclusion of all the other methods. It has the advantages of speed and independence of the degree of visibility and number of different signals that can be sent. Interference between waves from different machines is its only disadvantage and this may be greatly overcome by limiting the number of machines to each kilometer of front, and by prohibiting the sending of messages within two kilometers of the antennae of any receiving station along the front. This latter would set up what is called "jambing" which tends to drwon out messages from all machines in the vicinity. This interference is also avoided by the assignment of different wave lengths, varying the strength of emission and prefixing all messages by #Station Calls" (as AB). It may be necessary, in very congested sections, to give each observer a watch with a colored dial and assign him a color. The hand will pass over this color at intervals, during which time he may send signals.

There are other means of signalling used still in work with the infantry. Smoke-bombs may be dropped as signals to the receiving station, these bursting within sight of the ground. They may also be so constructed as to be shot from the Very's pistol. Both smoke-bombs and Very's lights are important means of attracting the attention of men in the trenches in connection with Infantry Cooperation as is also the Klaxon horn. Finally, written messages may be placed in a corrugated metal tube, called a Message Bag, about nine inches long and one and a half inches in diameter and provided with a long cloth streamer to keep its nose down and to help break the fall and attract attention as it falls to earth. These should be dropped as nearly as possible over the identification panel of the receiving station and where no enemy fire is falling other wise the purpose of airplane transmission, speed, is lost. The fall should not be over 300 ft. (for accuracy) and the receipt of the message should be acknowledged. All batteries within 500 m to the rear of the airplane should cease firing. Message bags are also made of canvas or heavy khaki.

Signal Codes Used.

As we have seen, these methods of signalling use either a code of their own, - as Very's lights which use a color code and ground-strips which use a code of position, - or they use the International Morse code of dots and dashes as in the case of wireless, windowshutter panel and projector. The French use two characters not included in our

Both smoke-bombs and Very's lights are important means of attracting the attention of attention as it falls to earth. These should be dropped as nearly as possible over the position of the receiving station and where no enemy fire is fall-wise the purpose of airplane transmission, speed is lost. The fall should not be over ...

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alphabet and you will have use for one and perhaps both of them. They are " e' 2 = ..-.. (acute e) and "ch" - ----.

Different groupings of letters and numerals in Morse are used for different code signlas. These are employed to convey as much information as possible with the fewest characters.

1. The code for adjustment of fire. (See card for 12 signals).
2. Service signals (See card for 10 signals).

For work on the range, the man in the lower gallery, acting will use the symbols "H", "L" and "OK" for "high", "low" and "correct", respectively, these corrections referring to the amount in figures, as we shall see later. The code will be discarded on leaving the school.

3. Single letters are used to designate important targets, as "R".
4. Two-letter groups, as AB, are used as station calls or battery calls.
5. Groups of two letters and one numeral are used to designate subgroups or posts of sub-commands in the same way as (4). EG., AB 1 means battery No. 1 of group AB
6. Three-letter groups, as BTA, "battery in action", are used to designate enemy positions. (See card for 11 signals).
7. Two-numeral groups, as 01, "first gun"; 28, "cease firing" are used for designation of locations and in adjusting fire. Some of these are left open for special uses. (See card for 31 signals).
8. Three-numeral groups are used for expressing distances in meters when correcting artillery fire. Eg., 101 - "100 meters", 075 - "75 meters", 175 - "175 meters", etc.
9. Four to ten numeral groups are used for expressing map coordinates or pin-points, eg., "09 25" or "22094 29256"
10. Messages in Morse code in complete words, which are to be used only when unavoidable.

Conduction of Shoots.

A concise definition for a "shoot" as we will use the term, may be given as follows:- " shoot is the coordinated action between a battery and an airplane observer with the purpose of destroying some enemy objective."

The closest touch between observer and battery commander is an essential factor in successful shooting. Not only should the onserver acquaint himself with the difficulties and elays a battery is likely to encounter, but also the conserving of his own time while in the air should be considered and every thing possible thot out and planned in detail between himself and the battery commander before undertaking a shoot. The observer has, on an average, but three hours a day for actual flying, and it must therefore be husbanded by careful preparation.

There are two general kinds of shoots, Prearranged and Impromptu.

A prearranged shoot is one in which the details are planned beforehand on some known enemy target, perhps the day or the evening before. Ninety-five percent of artillery observation can be thus prearranged, the observer being thoroly familiar with the location and details of the target to be attacked as well as the plan of attack, methods of signalling and wage length assigned, sizes and location of pieces and nature of shell and fusing to be used, and, finally, the time of flight of each type of projectile to be employed.

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b. Numerical groups
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Shoots which are not arranged beforehand are called Impromptu Shoots. The number of such shoots is comparatively small, being only about 5%. These include the engagaing by means of a spare battery or piece or, perhaps, if the target is of great enough importance, by interrupting the shoot in progress, some newly discovered target, as an enemy battery seen suddenly very active, or a target of a fleeting nature as a tropp concentration. It may be necessary for the Battery Commander himself to change his plan of counter-battery work and to order observation on an unplanned- for target, thus making the shoot impromptu.

Methods of firing and Reporting Fire.

It is the business of the observer to note where the shell falls with respect to the target and to report this to the Battery Commander. He simply tells what he sees. HE DOES NOT TELL THE B. C. HOW TO SET OR CHANGE HIS PIECE, this will be done according to the laws of artillery fire. The observer will make his repoft in a certain code form and the manner of doing this will depend upon the manner in which the battery is firing.

In all shoots, firing may be by piece, by salvo or by volley.

Fire by piece is sometimes used in starting a shoot (especially with the heavier pieces) or it may be ordered by the observer to correct erratic fire from a single piece during a shoot, the order designating the number of the piece to be adjusted. "Single Bursts" will, of course, result when but one piece is fired.

A salvo is a round of shots from all pieces of a battery, one shot from each piece and they are all fired as nearly simultaneously as possible. Salvo fire is used, especially from batteries of the lighter pieces, in registering targets and in adjusting fire in counter-battery work or in bombardment.

In volley fire, each piece of the battery fires the number of rounds disignated in the command and as rapidly as possible. The pieces do not fire in any particular sequence, but cease when the designated number of rounds have been fired. This will result in a "storm of projectiles and is termed, by the French "rafale".

In reporting single bursts, there are two general, cases, (1) Where the position of the battery is known to the observer, (2) Where the position of the battery is unknown to the observer.

When reporting single bursts about a target, with the position of the battery known, the line of sight between the battery and target is used as an axis of reference and is called the BATTERY-TARGET line. This line may be defined by a third point in it and close to the target, thus obviating the necessity of each time locating the battery in determining the B-T line. A burst is first reported as being so many meters to the right or left of this line. This is called the DEFLECTION error of the burst. A second axis amy be taken thru the target at right angles to the B-T and called the Target line. Then the burst is reported as being so many meters over or short measured from this line. This is called the RANGE error of the burst.

Occasionally, the position of the friendly battery is unknown to the observer, tho, of course, the bursts may be seen about the target. Here, since no B-T line can be drawn, recourse must be had to the points of the compass. A true north-south line and a true east-west line are drawn thru the target. Deflection erros are reported as being so many meters east or west (of the north-south line) and range errors so many meters north or south (of the east-west line). This is, of course, an arbitrary assumption. It is seen that both of these is a case of rectanugular coordinates, the area around the target being divided into four quadrants.

Plus and minus signs are not used, however, but instead the "senses" mentioned.

In either case, the report is made (telegraphed down) in a certain arbitrary code form as indicated by the following rules.

1. Report the deflection error first; then the range error.
2. Report the amount of the defelction error in multiples of 25 meters, the amount of the range error in multiples of 50 m.
3. Report the amount of the error first, then the sense, as 125 II not II 125.
4. Report the amount of the error in 3 figures, as 025 for 25 m.
5. Never end an amount in zero but repeat the next preceding figure not zero, as 055, 101, 202, 255, etc.

The reason for rule (2) will be readily understood by remembering the shape of the 100% zone of dispersion. It would be a waste of time and ammunition to correct range to so fine a degree as deflection.

In Fig. 13, the correction for the burst indicated would be (according to the above rules) "155 M M 101 H H"

In Fig. 14, the correction for the burst indicated would be, "055 E 202 N"

A salvo is made up of one shot fired from each piece of the battery and as nearly simultaneously as possible because then it is easier for the observer. Generally the Divisional Gun Batteries use salvo fire (75's) altho the rules given below will apply to a salvo from a battery of any number of pieces. The theory of correcting by salvo is based on the assumption that the target is an enemy battery position made up of the same number of emplacements as your own battery (4 for the 75's mentioned above) spaced the same as your own (20 meters, generally) and at right angles to the line of fire. The point of reference, or "reference point" of the target is the extreme right hand emplacement as viewed from your battery position (the enemy's left hand position). The battery-target line is drawn from your own right hand piece to this point. The target line is at right angles to this or thru the target. They theory then is that if your No. 1 piece is adjusted on their respective emplacements, the four pieces being adjusted for the same range and for parallel fire. So in addition to the rules to be observed in reporting single bursts, salvo fire necessitates the introduction of two more rules.

1. The deflection error of a salvo is the distance between the extreme right hand burst and the right of the target, or it is simply the deflection of the extreme right hand burst (because the B-T line is drawn thru the extreme right of the target).

2. The range error of the salvo is the mean range of all the bursts, or the distance between the mean point of impact (center of gravity of all the bursts) and the target line.

The manner of reporting is logical when it is remembered that there is no attempt to make an adjustment from the report of one burst or one salvo and that the 100% zone covers considerable ground; the B.C. cannot hope to so adjust his pieces that they will strike the objective with one particular shot, but he must center the 100% zone on the objective and then trust to luck that one or more shots will be effective.

The report "Z C" is never used. If there is a direct hit by a single burst or a good bracket by a salvo, it is reported "B". Signals out of the Two-numeral group give ways of reporting salvos that are bad or erratic.

There are certain variations of salvo fire which we will now note. Prior to aerial conduction of a shoot, it is the duty of the B.C. to adjust his pieces on his auxiliary target by means of terrestrial or ballon observation, in order that the first salvo in the preliminary adjustment on the enemy may be fairly accurate. In this Preliminary Adjustment, fire will usually proceed by salvos, each salvo being reported by the observer, or, in the case of the heavier weapons, by two-round battery volleys or even by piece.

After several round or salvos of this Preliminary Adjustment, fire for Amelioration (Final Adjustment) or still finer adjustment, take place, in which three salvos are fired in rapid succession, the observer reporting the number of single seen over and the number short (deflection errors not being considered, unless erratic, this having been taken care of in the Preliminary Adjustment). If, then, no further adjustment is necessary (as, for example, of a single piece) Fire for Effect begins. Here the observer may descend or remain in the air, depending on the nature of the case. Should he remain, no observation would be signalled unless the fire became, badly adjusted, except as we shall now see.

According to the nautre of the target, Fire for Effect is divided into fire for precision, when shooting at a single range, as in counter-battery work, and zone fire, when sweeping an already established bracket.

In fire for precision, two- to four-round volleys will be employed with the lighter pieces, the observer reporting the mean error of each volley, while with the heavier pieces, the fire will be by salvo for about 24 rounds, when the number of salvos over and short would be reported. If the adjustment is now satisfactory, continuous fire may be ordered and the pieces fired one after the other at regular intervals.

In zone fire, 12 to 24 rounds will be fired and the number of individual bursts over and short reported.

Method of Flying.

In the French practice, the course of the airplane is rectangular in general appearance at the start and then reduces to an elongated ellipse or practically a straight line at about right angles to the B-T line and about half way between the battery and target or up and down "no-man's land". This statement and the diagram must be taken in a general way, because each pilot and observer will probably develop a method of their own which will often be changed by circumstances. The elevation will be between two and three kilometers, depending upon the activity of the enemy machines, the activity of anti-aircraft guns and the visibility of the atmosphere. The distance from the lines, one way or the other, will depend largly upon the activity of enemy planes. The observer can fly out to, or even beyond, his target occasionally, but he cannot stay there over one spot long because he would be shot down. At first it was necessary for the observer to turn and fly toward his battery when sending, but, with present apparatus, this is no longer the case which relieves the observer of the danger of "exposing his tail to the enemy" and also saves time.

The diagram and explanation follow:

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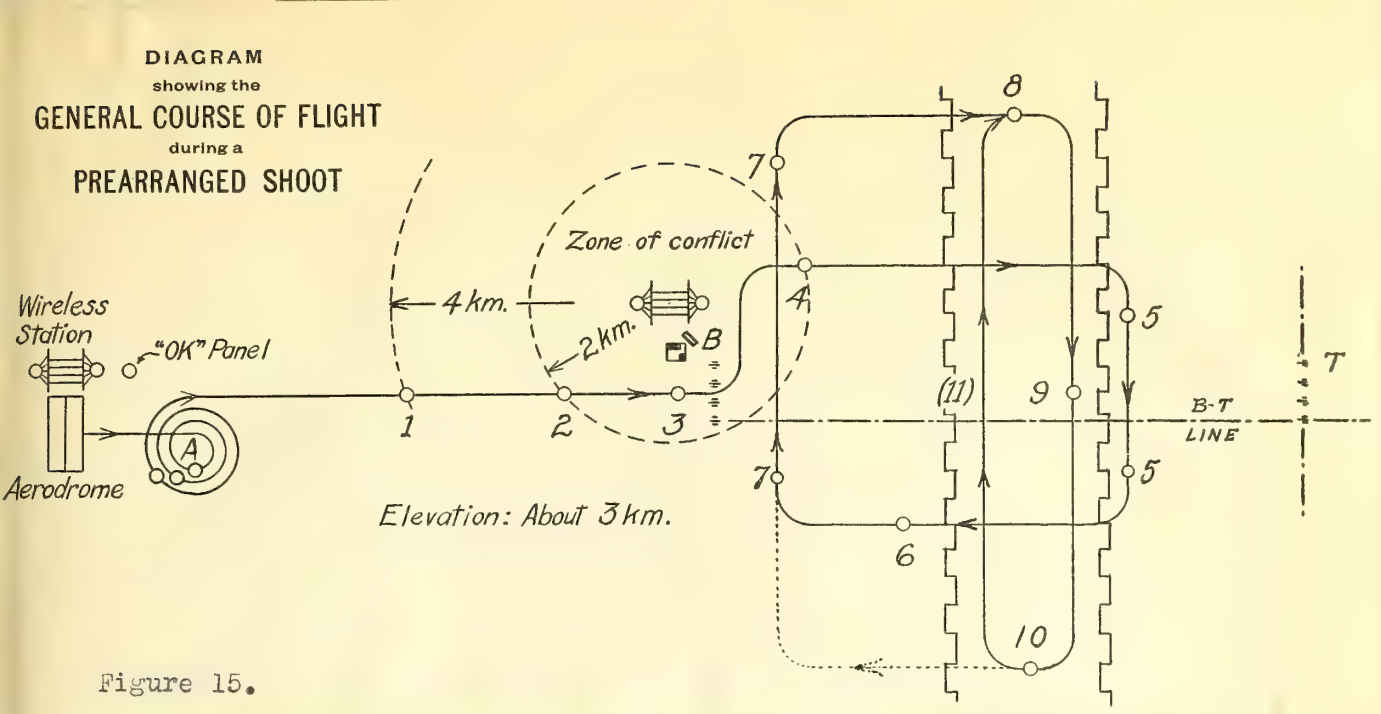


Figure 15.

B is the battery position.
T is the target or objective.
The zigzag lines represent the opposing trenches.

Before leaving Aerodrome call up B.C. by telephone if possible.
At A climb to required altitude and while so doing test out radio set to see that it is working by calling Aerodrome station. If OK. panel will be displayed, if not, no use going further.

At 1 (about 4km from battery) start to call battery wireless station by sending battery call, as "AB" — "AB" — "AB" — etc., at 30 second intervals.

At 2 (2km but 3 km from battery) stop calling to prevent "jumbling".

At 3 you will see Ground-strip message (4) if the battery operator has gotten tuned in to your wave length. If not, you will have to continue to send the call after you have passed out of the "Zone of conflict".

The next message which you will see may be (5) [Adjust] although this is generally omitted since it is understood that the battery requires adjustment. If you see any other message besides (4) you will acknowledge it after passing outside of the zone of conflict, i.e., at 4. This will be "AB [illegible]".

At 5 you will locate your target from such data as you may have, pinpoint, photograph, etc. For this you may fly out to or even behind the target.

At 6 you will send down a message similar to "AB [illegible] R AB" (R is the target designation, it might be a pin-point, and AB is a symbol used to conclude all except very short messages and corresponds to the period.)

At 7 you will see an acknowledgment to your message above, which is B.C. (4). As you fly on past your battery you should see a message similar to "AB [illegible]" either are ready to proceed or that there will be a delay. In the first case the message will be (3) — (6) or (17) depending upon which battery of the group you are working with. In the second case the message will be (6), (12), or (18) depending

upon the seriousness of the delay.

Whatever the message is, the observer will acknowleage it "AB SN" and he will then fly to such a position that he can send "Fire!" and his flight will carry him to a place where he will be in a good observing position by the time the shell falls.

At 8 he sends "AB Fire!"

At 9 he observes the burst of the shell and makeshis correction, probably with the aid of a photograph of the target taken the day before.

Between 9 and 10 he sends this correction down to the battery, eg., "AB 101 II 255 H H AR"

The battery may put out (7) after firing but the observer will seldom see it. The battery may put out (4) after the correction above but the observer will probably not see this either for the same reason, i.e., he is to far away. He will not again fly back and look for ground strips unless there is an interruption in the firing.

At 10 he will send "AB Fire!"

At 11 he will observe.

Between 11 and 8 he will send down the correction, eg., "Ab 055 I I 101 H H AR"

etc.

The observer will probably lengthen his path so as to make two or three observations before turning, flying as far as he can in each direction and still keeping the target in view. He will observe, first over the left hand edge of the plane, over the leading wing tip while approaching the target and over the trailing wing tip after passing his target; then he will turn, perhaps almost retracing his steps and observe over the right hand edge of the plane. There will be a certain place where the wing will practically hide the target from view so the pilot may swing out toward the target just before coming opposite it, then when about to cross the B=T line he will swing back quickly away from the target and gradually resume his flight at right angles to the B=T line. This method will cover the target by the wing for the minimum time.

As mentioned on page 3 under Time of Flight, the abserver sends "Fire!" and watches for the flash at his own battery. He then starts to allow for the time of flight of the projectile, perhaps with the aid of a stop-watch, and then, at the proper instant, looks over the other side of the machine and concentrates all his attention on the target. He calculates the correction at first by pointing the burst on a photograph or map although he may make it directly from the ground after he has become familiar with the country over which he is working and the altitude at which he is flying.

INTERPRETATION OF AERIAL PHOTOGRAPHS

There are many sources of information concerning the location, strength and movements of the enemy, such as personal observation, both terrestrial and aerial; reports of patrols and reconnoitering parties; reports of prisoners, both taken and escaped; flashes and sounds of fire; and finally photography. This last has many advantages; it gives fact, not fiction; it gets detail as well as important features specially sought; and finally it records permanently its observations. It is this combination of accuracy and "memory" that makes photography so reliable and invites its use in settling once for all any discrepancies or disputes arising from other means of observation.

The importance of photography makes it imperative that all whose duties have to do either with the collecting or use of aerial photographs become familiar with their interpretation.

There are two ways in which a picture can be taken from the air; Obliquely and Vertically. The first will give, of course, a panoramic view, which is easiest of comprehension to the unskilled student of air photographs and at the same time of considerable value to the commanding officer facing, for the first time, a new sector. It also aids in disclosing details, elevations and depressions hidden in the vertical photograph.

But vertical photographs mean the most to the expert and have the widest use. They may be divided into three general groups or classes; Definite area or position, Line, and Stereoscopic photographs. The first will be taken, as its name implies, of a certain locality or position for the purpose of getting further detail, to locate a point under observation more exactly, to verify a report, to detect camouflage, or to actually record a shoot. Line photographs are a succession of snaps, each one overlapping its preceding snap a little bit, taken as the observing machine flies along a line in an endeavor to get material for a photographic map. Of course a line photograph (one out of the series) may serve the purpose of the first type considered.

Any two photographs of the same area taken when shadows were the same and at slightly different angles, can be used as stereoscopic photographs. At short distances such as usually occur in ground photographs, special two-lens cameras are made and the two pictures, thus simultaneously taken at slightly different angles, are later viewed through a stereoscopic viewer to obtain relief. With the long-range work peculiar to air photography, a two-lens camera can, of course, not be used. The set is made up of two photographs, taken at the same elevation and at points separated by about one-eighth of the height, i.e., the observer flies this distance between snaps. Thus the overlapping section from two line photographs might be viewed stereoscopically. These stereoscopic photographs assist in determining the amount of rise or depression in the land below, the amount and nature of cover over emplacements and, consequently, in detecting camouflage.

Special features stand out prominently in all photographs, as trenches (main and communicating), locations of firing pieces (batteries, machine guns and trench mortars), openings to underground passages (dug-outs and mine shafts), lines of communication (railways, tramways, paths or tracks, buried cables and air lines) and barbed-wire entanglements.

Three (or sometimes two) successive positions or systems of defense, each

Consisting of at least two continuous lines of fire trenches and their communication trenches, constitute the German trench organization. The front line positions are the fire trenches while in the second and third positions are the support and reserves. Between the first and second, and again between the second and third positions there are nearly always at least two main communication trenches or feeders in each sector. Trenches are easily recognizable by a dark line of shadow down a strip of white where the chalky undersoil has been thrown out on the surface. This soil is of a light bluish color which photographs practically white (as blue does without a color filter). Dummy trenches show only the chalky line and the removed soil will often be found camouflaging a neighboring battery position.

Batteries in houses or woods or other cover are difficult to locate. In the open, they are more noticeable, especially during construction (digging-in and covering over). Blast marks, white on the ground, black in snow, where the surface has been blown away by the discharge (or the snow melted), at once expose a battery position. Anti-aircraft guns show up as circular emplacements. Batteries will usually consist of a group of two to four pieces.

Machine guns will usually be found in a trench traverse or at junctions of main and communication trenches or wherever a good enfilading position is afforded. Unusual angles in the trench construction or an occasional "V" in the parapet are almost certain indications of their presence.

Trench mortars are sited behind fire-trenches in specially constructed snaps or along communication trenches or trench tramways. They are especially numerous about 500 m from our own front lines and may be as far back as 700 m. The heavier casemated types show as small black squares (funnels) in the center of a circular mound or ring of earth.

Dug-outs and mine shaft entrances are especially noticeable during construction from the black nicks, usually in the side of a traverse at the corner, and also from the earth thrown out.

Railways and tramways can be distinguished by their fine straight lines (darker than roads), by bridges, embankments and cuttings and by their terminals.

Paths and tracks disclose headquarters, construction work, location of positions or importance (as batteries and ammunition dumps), wire and gaps in it, patrol paths and observation posts.

Burried cables disclose central stations and headquarters locations as well as batteries, and show up as much straighter lines than paths with jagged edges. Air lines show as white dots where poles are set, with a white track connecting them. Plowed land causes both to almost disappear.

Barbed-wire entanglements form straight uniform grayish streaks in a photograph. Gaps made in the wire for use of patrols or in attack show up plainly.

In studying any photograph, the following routine will be found to produce the best interpretations:

1. Previously study details in a map of the same area and keep the map at hand.
2. Ascertain the direction of light, and face it in viewing the picture.
3. Concentrate your attention on the particular details for which you are searching.
4. Search the photograph methodically.

5. Take photographic evidence independently, and with it compare and correct other evidence.
6. Compare with earlier photographs of the same locality.
7. Do not obliterate other details in annotating photographs.

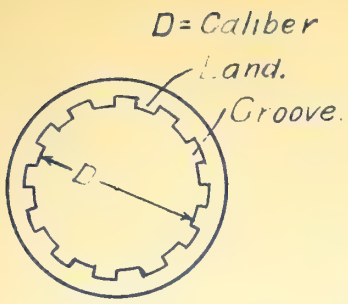


Fig. 1

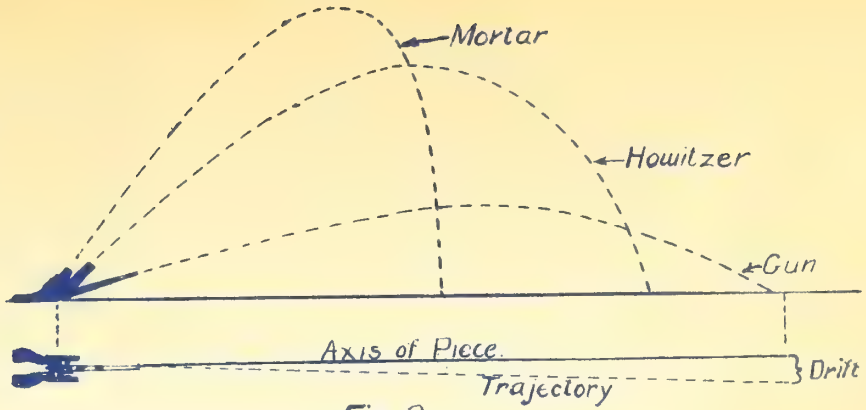


Fig. 2

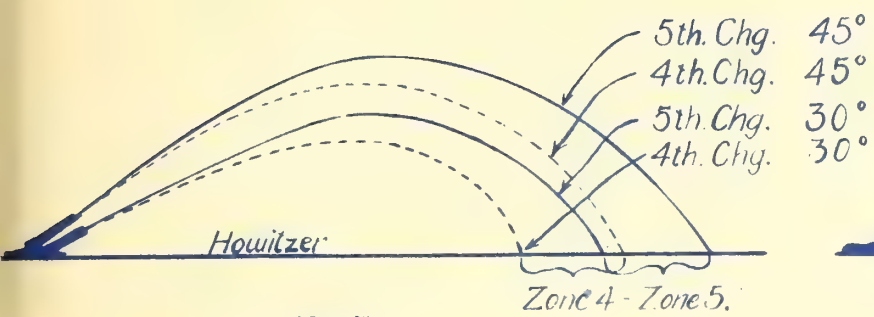


Fig. 3.

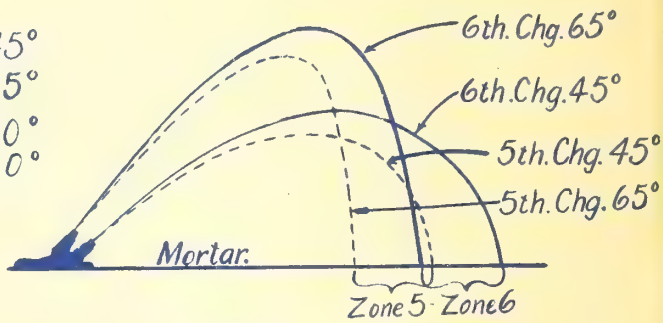


Fig. 4.

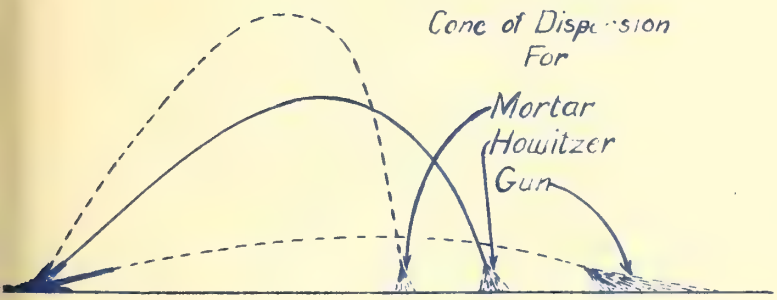


Fig. 5.

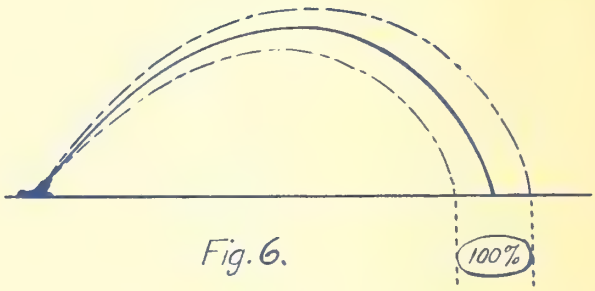


Fig. 6.

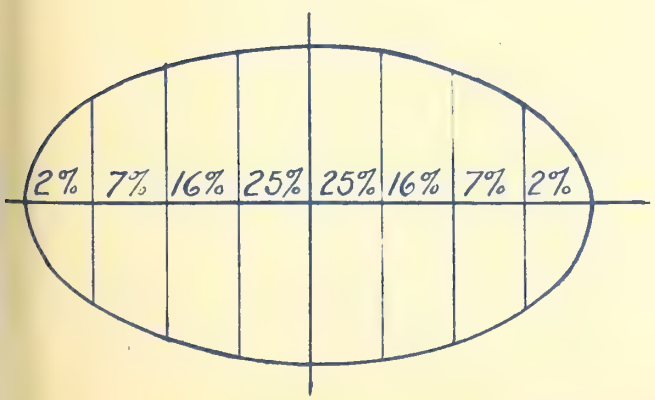


Fig. 7

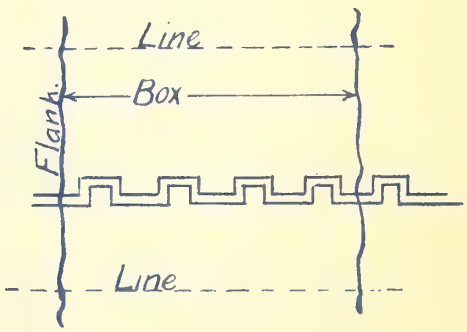


Fig. 8.

J.D.M.

THE

ORGANIZATION OF A FRENCH ARMY CORPS

ARTILLERY AND AIR SECTORS

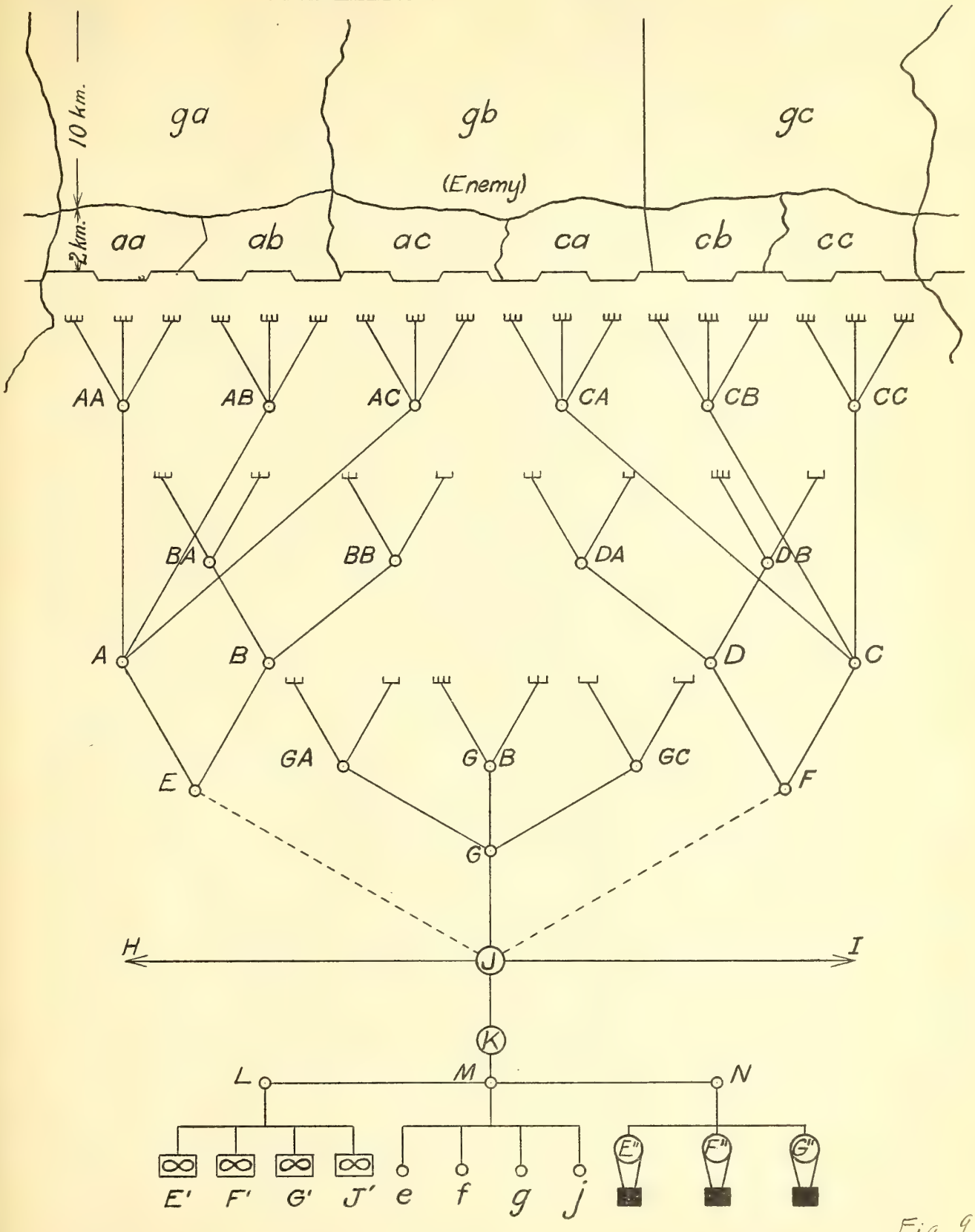


Fig. 9.

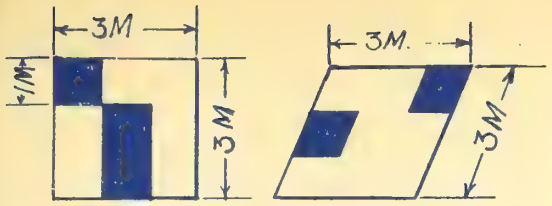


Fig. 10.

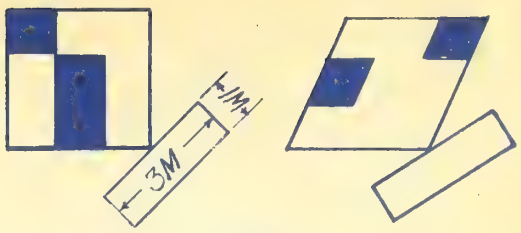


Fig. 11.

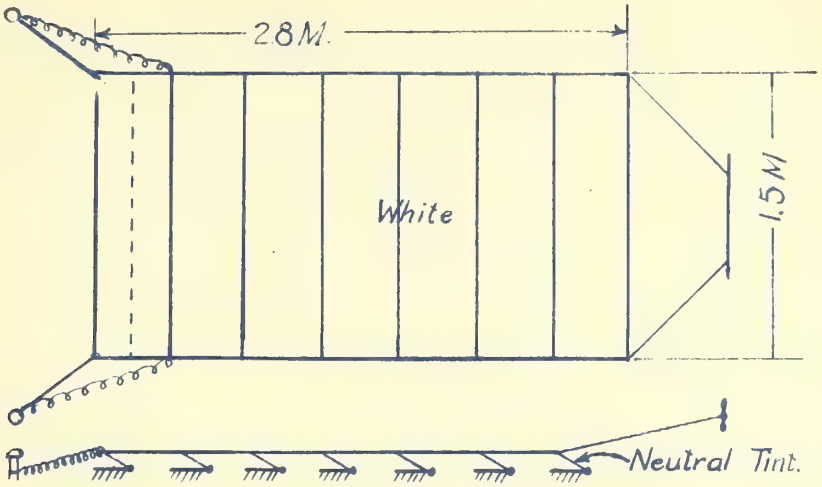


Fig. 12.

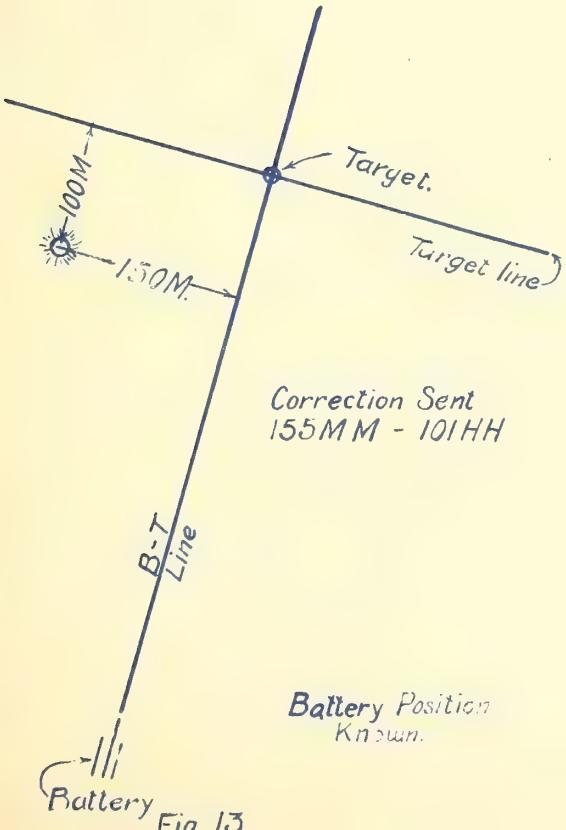


Fig. 13.

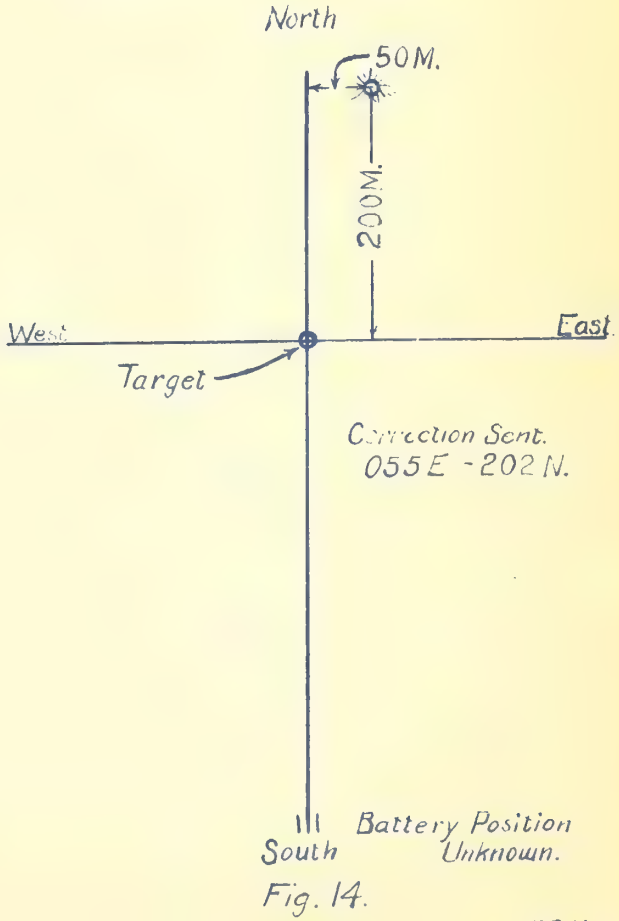


Fig. 14.

J.D.M

MINIATURE ARTILLERY OBSERVATION RANGE

INSTRUCTIONS And RULES which MUST BE OBSERVED

1. Bring your map of Belgium to every class on the Miniature Range. This must be the new map which is furnished you, suitably mounted, not cut and not colored or marked up except that you may color the roads and paths and number the kilometer grid lines on the edge of the area which you will use on the Range.

2. Bring your written instructions to class when same are furnished for the exercise in hand.

3. Use no ink in any form, do all work in pencil at all times.

4. Under no conditions call to your partner when he is in the other gallery. NO TALKING BETWEEN GALLERIES. The signalling system has been installed to take care of all communication. You cannot talk from an airplane to a man on the ground 10,000 feet below you. Imagine the confusion which would result in a class of 40 men if this rule were not enforced.

5. Keep a paper according to the prescribed form and write down your partner's message as you receive it and your reply before you send it. Since we cannot listen to what you send, this is the only way we have of knowing what you are doing and of helping you in your work. Before starting your work, be sure that you have your name (LAST NAME, FIRST) together with the seat you occupy (Airplane #___, or Battery #__) at the top of the page and your partner's name at the bottom of the page. This will save the instructor's time in asking for your name each time he wishes to look you up. Hand in a paper at the end of every period on the Range; it will be taken as an indication of your presence and your work for the period.

6. Do not disturb the class while you are receiving instructions at the beginning of the period. The man next to you may want to listen and besides it is annoying to the instructor. Overcome the desire to start operating your telegraph key!

7. Do not put your belongings on the floor beside the seat; it makes the passage inconvenient for others and besides is hard on the articles. Use the shelves and hat-hooks.

8. Do not drop your property from your seat to the ground 10,000 feet below. It may be in hostile territory and you cannot be sure of getting it back.

9. Do not try to send too fast at first. Remember that your partner may be no better at receiving than you are and your sending is probably not so good as the Radio instructor's. When your partner is receiving visually, cut your speed down to about one-half. Handle your key properly, as you are instructed to do by the Radio Department. DO NOT POUND YOUR KEY; it doesn't help.

10. See that you change places with your partner for each alternate period of work on the Range but do not change places during the period without special instructions. The schedule is arranged to balance up the work if this rule is observed.

11. Remember that the data, orders, etc. on the tables are for the use of other men as well as yourself and do not do anything to deface these markings.

12. Be careful about getting in and out of your seat and about moving around the gallery; try to imagine that you are in an airplane. In that case, your sending key will probably be strapped to your knee and you will be strapped to your seat. Be careful of the equipment on your table. When not in use, see that the head phone is hung on its hook and that the "ground strip tray" is in next to the wall. You will be required to sit properly in your seat and use the assigned desk for all exercises especially tests. Notice that the beams in the Observers' Gallery are rather low before you find it out from sad experience.

13. One long ring of the bell will mean that the period is up; the power for the communicating circuit will then be turned off so that you can no longer send or receive messages. See that your phone is hung up and that there are no lights on your battery table (if you are in that gallery) left latched on. Hand in your paper as you go out.

14. Remember that what you get out of this work will depend upon what you put into it in the way of spirit and imaginative effort. We have tried to simulate actual conditions but, necessarily, a great deal must be left to the imagination of the individual student.

Exercise No. 2

PIN-POINTING AND SIGNALLING

The purpose of this exercise is twofold;- first, to accustom a man to send messages to and receive messages from his partner by means of the signalling apparatus installed in the Miniature Range; second, to provide practice in finding a definite locality on the ground, the pin-point of which he has been given.

The wiring of the signalling system is so arranged that a man does not hear his signals in his own receiver. This corresponds to actual working conditions, since, at present, an observation plane is provided with a sending but not a receiving set and, further, the roar of the engine drowns any noise from the spark. Under this system, students often find it difficult to send code clearly at first. Normally, men should not change partners when once started in the work on the Miniature Range.

The first exercise in Pin-pointing is intended to give practice in transferring a definite point from the ground to the observer's map and then recording its coordinates or "pin-point". We next have the problem of working in the reverse order. The "pin-point" is given to the man, who finds the point on the map and then determines the designated locality on the ground. This exercise may be called "Locating Pin-points".

Twelve points will be given, each one marked by a light. The Observer will pin-point these, one at a time, giving each a name, e.g.: "A", "B", "C", etc. He will put this down on his paper and then signal same to his Battery Commander. While the Observer is pin-pointing the next light, the B.C. can locate the one just received. In order to decrease the number of characters signalled and also to get practice in abbreviating pin-points, the first figure will be omitted both in writing and in sending. For example, if the first pin-point taken by the Observer were at

2174 2952 it would be recorded and sent,

A 174 952

There should be no confusion on this account since every coordinate in the aera represented on the Miniature Range starts with the numeral "2". This numeral may be understood before each of the coordinates but it should not be written or sent. This will shorten each pin-point to a series of six instead of eight figures.

The detailed method of procedure will be as follows:-

Observer pin-points one of the lights.
Observer sends, CT (Attention)

B.C. Replies, BR (Ready to receive)

Observer sends, A 185 967
(185 967 is 2185 2967, abbreviated)

B.C. Repeats, A 185 967

(If B.C. repeats the pin-point correctly, the Observer should send O.K, if not, he should send "error" and then send the pin-point again. This correction may be made on the B.C.'s. paper by erasing if desired).

Observer sends O K

(The B.C. may now look up point "A" on his map and then find it on the GROUND to see if there is actually a light at that point or if, perhaps, his Observer has made a mistake. The B.C. is not responsible for any mistake his Observer may make; he should simply note after the point, in this case "no light" or, if it comes entirely off the area represented on the floor, he should note "off map". DO NOT ARGUE THE CORRECTNESS OF A POINT. If there is a light at the

point, B.C. should note after it, on his paper, "cross-roads", "house", "tree" or whatever it may happen to be. He should NOT signal this to his Observer. The B.C. should bear in mind, that in locating points to "four places", there is a possible error of 50 meters, or one-half of one of the divisions on the card, in each direction and he should make this allowance when looking up points from his Observer's figures.

The Observer may be looking up and locating the next point but, since he can (in most cases) do this more quickly than the B.C. can locate the last point sent, the next signal should come from the B.C.)

B.C. sends, BR (Ready to receive)

Observer sends, CT, then
B 176 945

B.C. repeats, B 176 944

Observer sends, "error", then
B 176 945

B.C. repeats, B 176 945

Observer sends, O K

(The B.C. can now look up this point while the Observer is pin-pointing his next light.)

B.C. sends, BR

Observer sends, CT, then
C 200 929

B.C. repeats, C 200 929

Observer sends, O K

etc. etc.

Either B.C. or Observer may ask to have any message repeated by sending UD (repeat).

DO NOT FORGET TO PUT YOUR NAME, LAST NAME FIRST, TOGETHER WITH YOUR BATTERY OR OBSERVER NUMBER (depending upon the gallery and seat which you occupy) AT THE TOP OF YOUR PAPER AND THEN PUT YOUR PARTNER'S NAME AT THE BOTTOM OF THE PAPER.

The two papers should look like this:-

Smith, L.D. Obs. #17	Jones, B.F. Battery #17
A 185 967	A 185 967 Cross roads near river
B 176 945	B 176 945 Castle with meat
C 200 929	C 200 929 No light
etc.	etc.
Partner Jones, B.F.	Partner Smith, L.D.

The B.C. should put down a brief description of each point after it to show that he has looked it up on the GROUND. It is not necessary for the Observer to do this, however, since he must have first found the point on the ground before he could determine its pin-point.

(Name)..... Observer #.. or Battery #.. Squadron #... Section #... (Date).....

ESTIMATING CORRECTIONS FOR SINGLE-BURSTS

Position of Battery KNOWN, hence we have a BATTERY-TARGET LINE.
Deflection, Right, or Left; Range, Over or Short.

Observer's Estimate	Partner's Reply: Your Estimate for Deflection is:	Partner's Reply: Your Estimate for Range is:
125 M M -- 202 Ch.	L	H
155 M M -- 155 Ch.	L	OK
175 M M -- 155 Ch.	OK	OK
202 I I -- 055 H H	L	H
225 I I -- C	L	OK
275 I I -- C	H	OK
255 I I -- C	OK	OK
175 M M -- 055 H H	OK	OK
Z -- 202 Ch.	OK	L
Z -- 255 Ch.	OK	OK
B	L	OK
025 M M -- C	OK	OK

Continue until the Observer has estimated correctly all the available shots around the target, the correct location for each shot being marked on the Battery table by the switch.

The Battery should then send his Observer a series of "K's", which is the equivalent in Morse code for Ground-strip signal. (20), and means "Change Target". The Observer will get another seat assignment from the Instructor in the Observers' Gallery and telegraph to his partner "Change Target", KK (connected), followed by this seat number.

Change and proceed same as above .....

It is not necessary, when changing seats, to make another heading, simply write down the Battery's message in the right hand column and then the Observer's message in the left hand column. This, then, will indicate to what seat the work applies.

Partner:
(Name).....

DIRECTIONS AND EXPLANATIONS

Observer and Battery should have identical papers to hand in. Write down every message you receive and every message you send, before you send it. Write the Observer's estimate in the left hand column and the Battery's answer to this estimate opposite it in the right hand column.

The Battery should not flash a light until his Observer gives the signal to fire! (three long dashes). He should then give the same light with each succeeding signal to fire! Until his Observer estimates it correctly. Then proceed to the next burst.

WRITE DOWN EVERY GUESS FOR EACH BURST, ALSO THE ANSWERS AND WHEN IT IS GOTTEN CORRECTLY, DRAW A LINE ACROSS THE TWO COLUMNS TO GROUP THE ESTIMATES THAT APPLY TO THE SAME BURST.

I I = Deflection Error, Right.
M M = Deflection Error, Left.
Z = Deflection Error, Nil.
Ch = Range Error, Over.
H H = Range Error, Short.
C = Range Error, Nil.
B = Direct Hit, or Target.

(Do not use a message "Z -- C" for a SINGLE-BURST; the correct report for a Hit is "B".)

These symbols make up the FIRE CODE. The Observer is reporting fire, so he should make each message correct as to form and symbols as it would actually be sent from an airplane. The AMOUNT is sent in three figures, never ending in zero. The AMOUNT is sent FIRST followed by the SENSE. DEFLECTION is sent FIRST followed by RANGE.

(Next page)

Battery #...
or
Observer #..

Remember that Deflection (Right or Left) is estimated to the nearest multiple of 25 meters only. Range (Over or Short) is estimated to the nearest multiple of 50 meters only.

The man in the upper gallery is the Observer. He will find, on his desk, the pin-point of his Target and also the Identification Panel of his Battery. He should look up his Target on the ground and also the Identification Panel of his Battery. This latter is almost directly beneath him next to the wall. He will have to lean out to see it. Fix an imaginery line from this Panel to the Target and then pick out a point beyond the Target that is in this line. When you are actually observing fire, the Target will be on one side of you and the Battery on the other; you cannot see both at the same time. This line is the Battery-Target Line; estimate Deflections Right or Left of it. Fix in mind an imaginary line thru the Target, and at right-angles to the Battery-Target Line. This line is the Target Line; estimate Ranges Over of Short of it.

The man in the lower gallery acts as the Battery but he is a great deal more than this. He is principally a laboratory assistant for his partner whom he is helping to learn to code single-bursts correctly. He can do this since the correct coding for each burst is marked on the table by its switch. SINCE HE CAN LOOK UP THE TARGET AND IDENTIFICATION PANEL, HE CAN, AT THE SAME TIME, BE USING HIS TIME TO GOOD ADVANTAGE BY MENTALLY ESTIMATING EACH BURST BEFORE LOOKING AT THE MARKING ON THE TABLE.

The signals from the Battery to the Observer ("H", "L" AND "OK" by telegraph) are creations for use on the Miniature Range only, since actually, the Battery Commander does not know where his shots are falling, the function of the Observer being to report this correctly. On the Miniature Range, the Battery IS NOT REPORTING FIRE, he is directing his partner's guesses. He should, therefore, use NONE OF THE CODE SYMBOLS used in reporting fire. If this rule is not followed, the student will be giving these "Fire" symbols two meanings, which invariably leads to confusion.

In directing his partner's guesses, then, the Battery should use the signals "H", "L" and "OK" and NOTHING ELSE.

H = High, i.e., "Your estimation of the 'amount' or distance is too great". It has no reference whatever to direction.

L = Low, i.e., "Your estimation of the 'amount' or distance is too small". It has no reference whatever to direction.

OK = Correct, i.e., "You have made the right estimate or guess".

If an Observer is told that he is guessing HIGH, he will, naturally, guess a smaller amount the next time, probably decreasing his estimate by 25 or 50 meter steps for deflection or range, respectively.

If an Observer is told that he is guessing LOW, he will, naturally, guess a larger amount the next time, probably increasing his estimate by 25 or 50 meter steps for deflection or range, respectively.

These three symbols, H, L and OK, are simple and their meanings are apparent. They do not conflict with any of the code symbols used in reporting fire. They will be used between partners when working together on the Miniature Range and, after that, may be forgotten.

If an Observer gets his direction or "sense" wrong, it would be well for the Battery to SPELL OUT to him the correct sense. For instance, if the Observer sends 025 I I when he should have sent 025 M M, the Battery should send him "L-E-F-T M M" and let him guess again.

(Name)..... Observer #... or Battery #... Squadron #... Section #... (Date) .....

ESTIMATING CORRECTIONS FOR SINGLE-BURSTS

Position of Battery UNKNOWN.

Deflection, East or West; Range, North or South.

Observer's Estimate	Partner's Reply: Your Estimate for Deflection is:	Your Estimate for Range is:
075 E - 101 N	H	OK
055 E - 101 N	OK	OK
125 W - 202 N	L	H
155 W - 155 N	L	OK
175 W - 155 N	OK	OK
202 W - 055 S	L	H
225 W - C	L	OK
275 W - C	H	OK
255 W - C	OK	OK
125 E - 355 S	H	L
101 E - 404 S	OK	OK
175 E - C	OK	OK
Z - 202 N	OK	L
Z - 225 N	OK	OK
B	L	OK
025 W - C	OK	OK

DIRECTIONS AND EXPLANATIONS

The form to be followed is exactly the same as that given for the KNOWN BATTERY. The only difference is the way in which the Deflection and Range are estimated.

Since the position of the Battery is Unknown, imagine a line running true North and South thru the Target; estimate Deflections East or West of this line. Imagine another line running true East and West thru the Target; estimate Ranges North or South of this line.

The FIRE CODE will now be:

E = Deflection Error, East.
W = Deflection Error, West.
Z = Deflection Error, Nil.
N = Range Error, North.
S = Range Error, South.
C = Range Error, Nil.
B = Direct Hit, or Target.

(Do not use a message "Z -- C" for a SINGLE-BURST; the correct report for a Hit is "B".)

The Battery will now use the set of "codings" on the table marked "Battery position UNKNOWN".

Except for what is noted above, everything on pages 1 and 2 applies to the work with the Unknown Battery the same as it does to the Known Battery.

Partner: (Name) ..... Battery #... or Observer #...

TYPICAL EXAMPLE OF A PREARRANGED SHOOT

Observer sends:-	Battery puts out:-
After testing wireless over aerodrome, tune in with battery by sending:	
PQ, PQ, PQ, PQ, (Battery call) at 20 second intervals, ...	Until battery puts out, (4), or perhaps (10), or possibly (1).
The Battery should put out (4). If you do not see (4) as you fly over your battery, continue to tune in until you see, ...	(2) (After (4), the next message from the Battery must be (2) before the shoot can proceed.)
PQ SN	
PQ REG 187 954 AR	
(REG is followed by the target designation which may be a pin-point, number or name)	(4)
(If a delay is necessary, then	(22) (Signal (5) might be displayed or (3) at once).
PQ SN	
(After about 10 minutes, watch for signals from the battery).	
	(3)
PQ SN	
PQ Fire!	
	Battery fires, and puts out,
	(7)

(A battery of small caliber pieces (under 155 mm) will generally make this preliminary adjustment by firing one salvo at a time, No. 1 gun having been previously registered on the "Trial Target" and then swung thru the required azimuth, the other three being set from this data for parallel fire and the same range. A batter of large caliber pieces, being more conservative of ammunition, will get its preliminary adjustment by firing No. 1 gun only, registering this on the "point of reference" of the objective and then setting the other pieces for the same range and parallel fire. So the preliminary adjustment will be by salvos or single bursts for small caliber or large caliber pieces respectively.)

PQ 101 M M 404 H H AR	
	(4) then, (3)
PQ SN	
PQ Fire!	
	Battery fires, (7)

PQ 055 M M 155 H H AR .....

(10)

PQ SN 055 M M 155 H H AR .....

(4) then,
(3)

PQ SN .....
PQ Fire! .....

Battery fires,
(7)

PQ 055 M M 101 H H AR .....

(4) then,
(3)

PQ SN .....
PQ Fire! .....

Battery fires,
(7)

PQ 23 .....

(4) then,
(3) Battery laid with same data.)

PQ SN .....
BQ Fire! .....

Battery fires,
(7)

PQ Z 055 Ch AR .....

(4)

xxxxxxxxxxxxxxxxxx

This preliminary adjustment is continued until satisfactory to the B.C.

(11)

PQ SN .....

(3)

PQ SN .....

If the Battery is made up of 75 mm guns, the shoot proceeds as follows after the B.C. has signalled "Final Adjustment".

PQ Fire! .....

Battery fires three salvos in succession with about a 5 second interval between each. This will make a series of 12 shots.

(7)

Observer notes (as nearly as he can) the number of shots which fall "over" and the number "short".

PQ Ch 8 H H 3 AR .....

(4) then,
(11)

PQ SN .....

(3)

PQ SN .....

PQ Fire! .....

Battery fires 3 salvos as before,
(7)

PQ Ch 6 H H 4 AR .....

(4)

xxxxxxxxxxxxxxxxxx

This Final Adjustment is continued until the distribution is satisfactory to the B.C., equal numbers "over" and "short", who then signals,

(16)

PQ SN .....

B.C. proceeds with "fire for effect" without further signals from the observer.

Generally, the B.C. will calculate the number of rounds necessary to destroy the target (or the number which he can afford to fire at it) and continue without an aerial observer. In this case he signals,

(12)

PQ SN BV .....

Or, in special cases, the observer may continue to watch the effect of the fire until the result is attained, in which case he signals:

PQ 28 (Break) 29 .....

(4) then,
(12)

PQ SN BV .....

Either ends the shoot ----------

If the battery is made up of 155 mm pieces, or larger, the shoot proceeds as follows, after the B.C. has signalled "Final Adjustment":- (Continuing from division, middle of Page 2.)

PQ Fire! .....

Battery fires 1 salvo.

PQ Fire! .....

Battery fires 1 salvo.

PQ Fire! .....

Battery fires 1 salvo.

(7)

Observer notes, as before, the number of shots, out of the 12, which fall "over" and the number "short".

PQ Ch 4 H H 7 AR .....

(4) then,
(11)

PQ SN .....

(3)

PQ SN .....

PQ Fire! .....

Battery fires 1 salvo

PQ Fire! .....

Battery fires 1 salvo

PQ Fire! .....

Battery fires 1 salvo.
(7)

PQ Ch 5 H H 6 AR .....

(4)
When the adjustment is satisfactory to the B.C. he signals.

(16)

PQ SN .....

B.C. proceeds with "fire for effect" without further signals from the observer.

The Observer continues to watch the effect of the fire.

If, after some minutes of "fire for effect", the adjustment becomes slightly inexact, the observer may note, out of 3 salvos, the number of shots that fall over and the number short and report,

PQ Ch 8 H H 2 AR, ...

(4)

xxxxxxxxxxxxxxxx

Or, if he is unable to count the shots (as is generally the case in "fire for effect") he may simply indicate the mean point of impact,

PQ 101 Ch AR .....

(4)

The battery readjusts on this data without interrupting the shoot.

If, after 10 minutes of "fire for effect", the fire becomes badly adjusted, but all pieces firing about alike, the observer may send,

PQ 23 .....

(4)

PQ 37 .....

(4) then,
(3)

PQ SN .....
PQ Fire! .....

Battery fires 1 salvo.
(7)

PQ 101 M M 303 Ch AR .....

(4) then,
(3)

PQ SN .....
PQ Fire! .....

Battery fires 1 salvo.
(7)

PQ 055 M M 155 Ch AR .....

(4)

xxxxxxxxxxxxxxxxx

When the adjustment is, again satisfactory, the B.C. will signal,

(18)

and the shoot will continue without further signal from the observer.

If, after 10 minutes of "fire for effect", the fire becomes very badly adjusted, the different pieces in the battery shooting quite erratically, the Observer may send,

PQ 28 (Break) 24
(Or, instead or 24, perhaps 22, 33 or 36) .....
(4)

PQ 05 .....
(4) then,
(3)

PQ SN .....
PQ 01 Fire! .....
No. 1 gun fires, 1 shot.

PQ 02 Fire! .....
No. 2 gun fires.

PQ 03 Fire! .....
No. 3 gun fires.

PQ 04 Fire! .....
No. 4 gun fires.

(7)

PQ 202 M M 101 Ch (Break)
255 M M 155 Ch (Break)
303 I I 055 H H (Break)
202 I I 101 H H AR .....
(4) then,
(8)

PQ SN .....
(3)

PQ SN .....
PQ 01 Fire! .....
No. 1 gun fires.

PQ 02 Fire! .....
No. 2 gun fires.

PQ 03 Fire! .....
No. 3 gun fires.

PQ 04 Fire! .....
No. 4 gun fires.

(7)

PQ 055 M M 101 Ch (Break)
Z 055 H H (Break)
Z 101 H H (Break)
055 I I C AR .....
(4)

This is continued until satisfactory to the B.C. He may then adjust further by single salvos, in which case he will signal,

(9)

PQ SN .....

(3) etc.

Generally, however, Final Adjustment is ordered at once,

(11)

PQ SN .....

(3)

PQ SN .....

The Final Adjustment will proceed exactly as that previously gone thru with on Page 3, until the B.C. again signals,

PQ SN .....

(16)

B.C. proceeds with "fire for effect" without further signals from the observer.

After "fire for effect" is properly adjusted, the B.C. generally calculates the number of rounds necessary to destroy the target and, after firing a sufficient number, signals,

(12)

PQ SN BV .....

Or, the Observer may note when the desired result has been attained and signal,

PQ 28 (Break) 29 .....

(4) then,
(12)

PQ SN BV .....

The shoot is ended in one of these two ways, no matter whether it has been interrupted because of bad adjustment, as indicated by the three different cases, or not. ---

---

NOTICE PARTICULARLY.

Every message from the Observer is preceeded by the "Battery Call".

Every message from the battery is immediately acknowledged by "SN", so that the ground strips may be taken in. The two exceptions are the "Acknowledgement", or "Understood", (4) and "Battery has fired," (7).

Every message from the Observer is acknowledged by the battery by "Understood"., (4). The two exceptions are, the "Acknowledgement", "SN" and "Fire!" This latter is answered by the burst, or bursts, a few seconds later.

Most messages from the air are concluded by "End of message", AR. This is not always necessary, however, especially in messages of only two symbols.

The "Break", BT, is used to separate the elements of a message.

13, "Control Fire", is sent when the observer wishes to correct an adjustment made on a target per haps several hours before.

21, "Observation Impossible", -- on account of clouds or fog.

23, "No Observation, Couldn't See", means that the observer was not in a position to see.

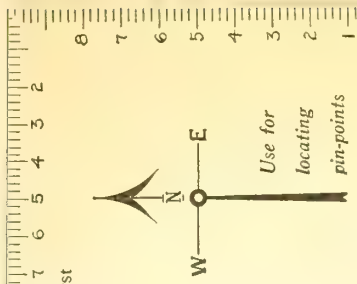
27, "Lost", means that the observer was in a position to observe but saw nothing.

The battery would not change the data on which it was last laid if it received either 21 or 23. But, if it received 27 (unless it had not fired at all) it would lay on data half way between that of the last shot seen by the aerial observer and the shot which he has been unable to see.

There is a difference in the way in which Final Adjustment is delivered from a battery of small caliber pieces and a battery of large caliber pieces. There are two reasons for this:- cost of ammunition and the time it takes to load the pieces. There is also a difference in the preliminary adjustments as noted on the first page.

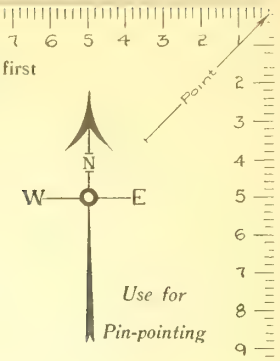
Note:

The numbers in parentheses appearing in the right hand column, signals from the battery, represent the numbers of these Ground Strip Code Symbols as they appear on the CODE CARD. They are to be looked up and filled in (together with their meanings, if necessary) by the student before he starts in on a practice shoot.



THE UNITED STATES
SCHOOL OF MILITARY AERONAUTICS
UNIVERSITY OF CALIFORNIA
BERKELEY, CALIFORNIA

DEPARTMENT OF OBSERVATION



CODE SIGNALS

CODE FOR ADJUSTMENT OF FIRE

FIRE!	3 long dashes
Deflection error RIGHT	I I
" " LEFT	M M
" " EAST	E
" " WEST	W
" " NIL	Z
Range error OVER	Ch (French)
" " SHORT	H H
" " NORTH	N
" " SOUTH	S
" " NIL	C
Target HIT, or BRACKETED	B

SERVICE SIGNALS

ATTENTION (or call)	CT
READY TO RECEIVE	BR
UNDERSTOOD	SN
ERROR	8 or 10 dots
REPEAT (or ?)	UD
BREAK (or SEPARATION)	BT
WAIT	AS
CHANGE TO TARGET No. / OBSERVE FIRE ON TARGET No.	KK
END OF MESSAGE	AR
GOING TO LAND	BV

INSTRUCTOR'S CODE

(For use on Miniature Range ONLY, in correcting OBSERVER'S estimates in AMOUNT)

HIGH	H
LOW	L
CORRECT	O K

SUPPLEMENTARY CODE FOR ADJUSTMENT OF FIRE AND FOR DESIGNATION OF LOCATIONS

First gun	0 1	No observation. Couldn't see	2 3
Second gun	0 2	Deflection very irregular	2 4
Third gun	0 3	Will observe as requested	2 5
Fourth gun	0 4	High explosive shells	2 6
Singly	0 5	Lost	2 7
Is battery ready?	0 6	Cease firing	2 8
Has battery fired?	0 7	Result attained	2 9
Can't see lamp	0 8	I can see friendly shots falling on	3 1
Can't see panels	1 1	Continue the fire	3 2
Auxiliary target	1 2	Too scattered	3 3
Control fire	1 3	Shrapnel, time-fire	3 4
From the gun at right	1 4	Zone fire, I stop observing	3 5
From the gun at left	1 8	Too concentrated	3 6
How many guns firing?	1 9	By battery volleys (salvos)	3 7
Observation impossible	2 1	Repeat	3 9
Range very irregular	2 2		

FOR DESIGNATION OF TARGETS AND ENEMY POSITIONS

Adjust on, *or* / Ready to Adjust on (followed by designation of target.)	REG	Convoy	COV
Battery in action	BTA	Infantry in column	IFC
Battery occupied	BTO	East of	EST
Cavalry	CAV	North of	NOR
		West of	OUS
		South of	SUD
		Railroad train	TCF

7. Conventional signs on United States Geological Survey Maps taken up later.

8. More common abbreviations used should be memorized. Learn abbreviations used on French maps.

GROUND STRIP CODE SIGNALS

		Light Artillery	Heavy Artillery
(1).	Can't hear you. Fire not adjusted.		
(2).	Adjust!		
(3).	First battery is ready.		
(4).	Yes! Understood. Message received.		
(5).	Wait a few minutes.		
(6).	Second battery is ready.		
(7).	Battery has fired.		
(8).	Fire by piece.		
(9).	Fire by salvo.		
(10).	Your wireless works but signals confused; repeat!		
(11).	Fire for amelioration (final adjustment).		
(12).	No further need of you.		
(13).	Adjust on target you just indicated.		
(14).	Observe fire of such and such group. (Show proper identification panel. Axis of strips points approximately to new group.)		
(15).	Signal reserved to indicate landing grounds.		
(16).	Continuous fire for effect.		
(17).	Third battery is ready.		
(18).	Series of 24 rounds.		
(19).	No!		
(20).	Change to target No. ..... Observe fire on target No.		
(21).	Hostile airplane near us.		
(22).	Battery not ready, delay of at least 10 minutes.		
(23).	Fire for control.		
(24).	Enemy attacks, be guided by previous agreement.		
(25).	Signal placed at the disposition of the artillery.		

NUMERALS

NOTE: Identification panel, 3 m. by 3 m.
Ground strips, 1 m. by 3m.
Distance between parallel panels or strips, 2 m.

Map Reading.

Syllabus

Importance of Map Knowledge, Conventional Signs, Scales.

Importance of Map Knowledge to a Military Aviator.

1. Must be able to find his way. Must not get lost.
2. Locate and describe points of military importance.
3. Use of landmarks.
4. What constitutes a map, and meaning of Map Reading.
5. Necessity for thorough knowledge of symbols used on maps.
6. Map reading as a check on compass.
7. Sketching required of an aviator.

Nature of Maps Used in Military Operations.

1. Information furnished depends upon purpose of construction.
2. Topographic map. Importance of topography.
3. What a properly constructed military map should show.
4. What the military map for the aviator should show.

Conventional Signs and Abbreviations.

1. Meaning of conventional signs.
2. Variation in symbols used on different maps.
3. Attempt is made to use symbols resembling object represented, if possible.
4. In sketching, make conventional signs small.
5. Importance of learning conventional signs thoroughly and exactly as represented. Note colors used.
6. Study carefully card of British and French conventional signs.
7. Conventional signs on United States Geological Survey Maps taken up later.
8. More common abbreviations used should be memorized. Learn abbreviations used on French maps.

Meaning of Map Scales and Method of Representation.

1. To furnish any idea of distances, maps must be drawn to scale.

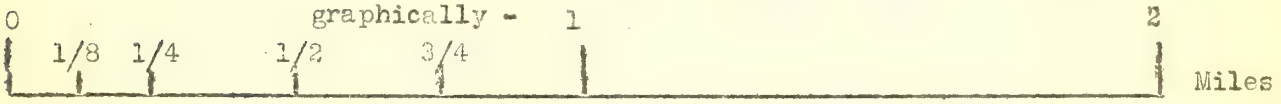
2. Definition of Map Scale -- Ratio of distance on map to corresponding distance on ground.

3. Three methods of representing map scales:

   First Method: By a plain statement in words and figures. Example: 3" = one mile; 1" = 1000 yards, etc.

   Second Method: Graphically, by a line drawn on border of map actually representing the scale, the line being divided into equal parts and each part being marked with the distance it represents on the ground.

   Example: Represent scale 3" = one mile, graphically -



   Third Method: By Representative Fraction, (R.F.): The numerator of fraction is unity and represents distance on map, the denominator represents number of units of measure on ground represented by one unit on map, both numerator and denominator being expressed in same unit of measure.

   Example: $\frac{1}{21,120}$, means that one unit on map represents 21,120 of same units on ground.

4. On properly constructed map, R.F. and graphical scale should be shown, and first method also desirable.

5. Advantages of each method of representing scales:
   - First: Permits forming of quick mental estimates of distance on the ground.
   - Second: Still correct after size of map is altered; also convenient means of measuring distances on map.
   - Third: Any unit of measure may be assigned to the R.F.; hence it is always intelligible, regardless of unit of measure used in graphical scale.

Relative Size of Map Scales:

1. Determination of scale to be used. Scales used for military sketches.

2. "Large scale", if R.F. is relatively large fraction. Comparative size of area represented on large scale maps.

3. "Small scale", if R.F. is relatively small fraction. Comparative size of area represented on small scale maps.

4. R.F.s as small as $\frac{1}{40,000}$ considered as large scale.

   R.F.s smaller than $\frac{1}{40,000}$ considered small scale maps.

French "Battle Maps" -- (Plans Directeurs).

Use and Nature.

1. Originally used chiefly for directing artillery fire; now made to meet various other requirements.

Scales of French Battle Maps.

1. Size and scale determined by requirements of commander, staff or different branches of the service.

2. R.F. $\frac{1}{20,000}$, original "battle map". Used by artillery for designating targets and conducting fire, especially on enemy batteries.

3. R.F. $\frac{1}{10,000}$, shows greater detail. Used by commander and staff, also by artillery for fire on trenches.

4. R.F. $\frac{1}{5,000}$, still greater detail. Used by infantry, also also by artillery. Special map for use in attacks.

5. Maps showing French trenches usually at scale of 1 to 10,000.

Scales of Special French Maps.

1. R.F. $\frac{1}{50,000}$, schematic map showing safety of our own highways, roads, railways, etc. Confidential map.

2. R.F. $\frac{1}{50,000}$, showing enemy positions, trenches, railways, etc

3. R.F. $\frac{1}{50,000}$, scale of new official French map in 8 colors.

4. Special sketches R.F. $\frac{1}{10,000}$ to as large as $\frac{1}{2500}$.

5. Maps of special sections of defense as large as $\frac{1}{2500}$. and $\frac{1}{5000}$.

6. R.F. $\frac{1}{80,000}$, general map of traffic routes, railroads, etc.

7. R.F. $\frac{1}{200,000}$, general small scale map in 6 colors.

8. R.F. $\frac{1}{40,000}$, general large scale map. R.F. $\frac{1}{100,000}$, general map of traffic routes, railways, towns, etc.

Scale of British Maps.

(a) Small Scale Maps:

1. Scale 1 to 380,160, or 6 miles to one inch, general small scale map.

2. Scale 1 to 200,000, based on French map of 1 to 200,000.

3. Scale 1 to 250,000, useful strategical map.

4. Scale 1 to 100,000, official tactical map.

(b) Large Scale Maps:

1. Scale 1 to 40,000 and larger, practically same as French.

Maps Used by American Expeditionary Forces:

1. Prescribed by General Order No. 60.

Class	Designation
1 : 5,000	Detail trenches, town plans, fortifications, etc.
1 : 10,000	Detail trenches, special maps, small objective, location batteries, target maps.
1 : 20,000	Detail trenches, active batteries, enemy organization.
1 : 40,000	Large scale general map for general study of front.
1 : 80,000	Traffic routes, administration, railways, bridges, water supply, etc.
1 : 200,000	General map.
1 : 600,000	General map for office purposes.

Metric Units of Measure of Distances:

1. Scales of French maps in metric system.

2. Maps of A.E.F. have metric scales, also scale in yards or miles

3. Metric system based on unit "ten". Fundamental unit is the meter.

Units of Length.

millimeter	=	.001 meter
centimeter	=	.01 "
decimeter	=	.1 "
meter	=	1. "
dekameter	=	10. "
hektometer	=	100. "
kilometer	=	1000. "

Conversion Factors.

1. Kilometer takes the place of the mile. Meter is used in place of yard.

2. One mile = 1760 yards = 5280' = 63,360" = 1.61 kilometers.
   One Kilometer = 1000 meters = 100,000 centimeters = 39,370" = 0.62 mile.
   One yard = 36" = 0.91 meter.
   One meter = 39.37" = 1.09 yards.

Scaling Distances from a Map.

1. Use of graphical scale to measure distances.
   (a) By transferring distance to the scale.
   (b) By transferring scale to straight-edged sheet of paper.
   (c) By means of dividers.

2. Distances also measured by:
   (a) Ordinary inch rule.
   (c) Map measurer.

MAP READING

Syllabus

Problems on Map Scales

Thorough Understanding of Map Scales Necessary.

1. Know how to use each method of expressing scales and how to change from one to another.

2. Some of more common types of scale problems as follows:

To Derive R.F. from Statement of Scale in Words and Figures:

1. Should be understood from definition of R.F.

2. Example: What is the R.F. for scale 6" = 1 mile?

Solution: $\frac{\text{Map distance}}{\text{Corresponding ground distance}} = \frac{6"}{1 \text{ mile}} = \frac{6"}{63{,}360"} = \frac{1}{10{,}560} = \text{R.F.}$

"Miles per Inch" and "Inches per Mile".

1. Understanding of these terms is important.

2. "Miles per inch" means, the number of miles on the ground represented by one inch on the map.

3. "Inches per mile" means, the number or the fraction of an inch required on the map to represent one mile on the ground.

4. Derived from R.F.

5. Example: Express the scale, R.F. $\frac{1}{200{,}000}$ in "miles per inch" and in "inches per mile".

Solution: (a) "Miles per inch,"-

1" on map = 200,000" on the ground

1" " " = 200,000 ÷ 63,360 = 3.16 miles on the ground.

(b) "Inches per mile"

1" on map = 200,000" on the ground.

Inches on map required to represent one mile on ground =

63,360 ÷ 200,000 = .32" approximately.

6. Usefulness of expressions, "miles per inch" and "inches per mile".

Construction of Graphical Scale:

1. Graphical scale subdivided into:
   (a) Reading graphical scale.
   (b) Working graphical scale.

2. Choice of unit of measure to use in sketching. Depends on scale of the sketch and facilities available.

3. Example: Construct a working scale of paces to use in making a sketch at a scale of 12" = one mile, assuming that 110 paces = 100 yards.

Solution: 1st Step. Find R.F. of proposed sketch.

$$\frac{12"}{1 \text{ mile}} = \frac{12"}{63{,}350"} = \frac{1}{5{,}280} = \text{R.F.}$$

2nd Step. Find number of inches in the unit of measure to be used in the working scale.

Unit of measure = 1 pace. 110 paces = 100 yards.

$$1 \text{ pace} = \frac{3600}{110} = 32.7"$$

3rd Step. Find number of units of measure represented by one inch on the sketch.

From the R.F., 1" on sketch = 5,280" on the ground.

Then 1" on sketch = $\frac{5280}{32.7}$ = 161 paces on the ground.

4th Step. Choose an even number of units of measure to give a convenient length working scale (usually from 4 to 6 inches long), and find exact length of scale to represent the number of units chosen.

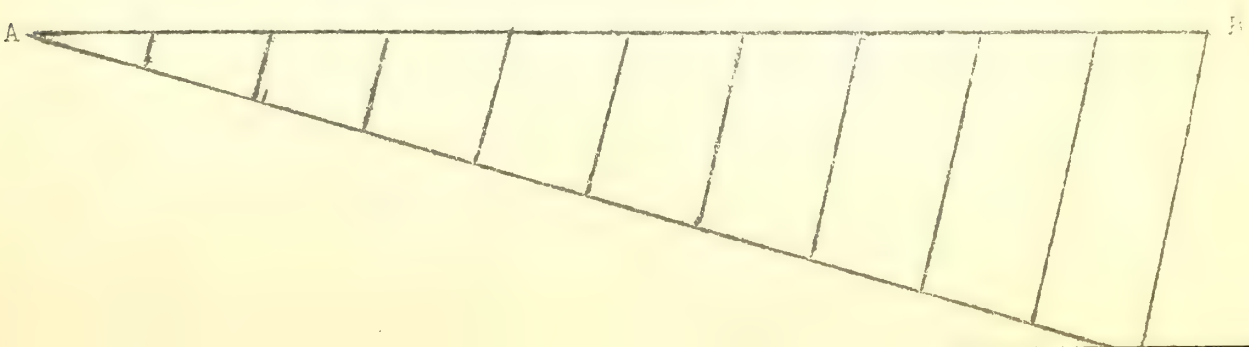
1" on sketch = 161 paces on ground.

Choose 1000 paces as the distance to be represented by the working scale.

Length of scale = $\frac{1000}{161}$ = 6.2".

5th Step. Lay off a line 6.2" long and divide into a convenient number of parts. If divided into 10 parts, each part will represent 100 paces, etc.

Method of dividing a line of odd length into a number of equal parts by means of a series of parallel lines.



4. Construction of Reading Graphical Scale made in same way except different units of measure used.

5. Often possible to shorten above method by using simple proportion.

Example: Construct a reading scale to represent 10,000 yards for a map having the R.F. $\frac{1}{80,000}$.

Solution: 10,000 yards = 360,000".

1:80,000 :: X : 360,000

Length of scale = X = $\frac{360,000}{80,000}$ = 4.5"

Lay off a line 4.5" long which will represent 10,000 yards and subdivide into 10 equal parts.



Determining the Scale from Points of Known Distance.

1. To use a sketch from which scale had been omitted. Measure distance between two points on map and between same two points on the ground; determine R.F. and construct scale.

2. Example: On a sketch having no scale, the distance on the ground between two crossroads is measured and found to be 1500 yards. The distance between the same two points on the map is measured and found to be $1\frac{1}{2}$". What is the R.F. of the sketch?

$1\frac{1}{2}$" = 1500 yards = 54,000".

1" = 2/3 x 54,000" = 36,000". Hence R.F. = $\frac{1}{36,000}$

Knowing the R.F., a reading scale of yards can be constructed, if desired.

To Convert from French Scale into English Scales.

1. Example: Given a French map having a graphical scale in kilometers, but the R.F. is not given. By measuring the graphical scale you find that a distance of 1" represents 2 kilometers.

(a) What is the R.F.?

(b) What will be the length in inches on the map of a reading scale to represent 6 miles?

Solution: (a) 1" on map = 2 kilometers = 2 x 39,370" = 78,740" on the ground. R.F. = $\frac{1}{78,740}$.

(b) 6 miles = 6 x 63,360" = 380,160"

1:78,740 : : X:380,160

Length of scale to represent 6 miles = $\frac{380,160}{78,740}$ = 4.83"

Lay off a line 4.83" long and divide into 6 parts.
Each part will represent one mile.



To Convert from English Scales into French Scales.

1. Example: Having given a map having a scale of 3" = 1 mile. Construct a scale of kilometers.

Solution: R.F. = $\frac{1}{21,120}$ 1 Kilometer = 39,370"

1" on map = $\frac{21,120}{39,370}$ = .53 kilometer

Choose length of scale to represent 3 kilometers.

Length of scale = $\frac{3}{.53}$ = 5.66" long.

Lay off a line 5.66" long and divide into 3 equal parts. Each part will represent one kilometer.



Estimating Distances by Approximating the Scale.

1. It is of value that a person be able to estimate distances by approximating the distance on the map and multiplying by the factor to give distance on the ground. This is useful in making a rapid check on a distance which has been scaled off the map by some more careful method.

Exercises in Scales.

A. What are the R.F.s for the following scales?

1. 2" = 1 mile. 2. 1" = 1000 yds. 3. $2\frac{1}{2}$" = 5 miles

4. 1 centimeter = 1 kilometer 5. 1.08" = 1 kilometer 6.

6. $\frac{1}{2}$" = 1000 meters. 7. 2" = 9 miles.

B. Express each of the following scales in "miles per inch" and "inches per mile".

1. R.F. $\frac{1}{250,000}$. 2. R.F. $\frac{1}{100,000}$. 3. R.F. $\frac{1}{80,000}$. 4 R.F. $\frac{1}{40,000}$.

5. R.F. $\frac{1}{20,000}$. 6. R.F. $\frac{1}{10,000}$. 7. R.F. $\frac{1}{5000}$. 8. R.F. $\frac{1}{62,500}$.

9. R.F. $\frac{1}{31,680}$.

C. Construct a scale of yards at 4" to the mile.

D. Construct a scale of paces for use on a map having a scale 3" = 1 mile Length of pace = 33."

E. Your machine has an average rate of flight of 75 miles per hour. Construct a scale in minutes for a R.F. of $\frac{1}{250,000}$.

F. Construct a scale of revolutions for a bicycle having a wheel diameter of 30". Scale of map, 6" = 1 mile.

MAP READING

SYLLABUS

Orientation, Direction, Azimuth, Variation, Deviation, Sketching Methods.

Direction:

1. One of the most important elements of map reading is the question of direction.

Orientation:

1. In using a map it is necessary for it to be properly oriented.

2. Meaning of orientation - placing map so that directions on the map agree with directions on ground. A properly oriented map is in such a position that if the map were enlarged to the size of the ground represented, every symbol on the map would fall directly on the object it represents on the ground.

North and South Lines:

1. Top of map usually north, but this should always be checked.

2. Lines to which direction are referred are true meridian and magnetic meridian.

3. The true meridian, or true north line, through a point is the straight line joining that point with geographic north pole of the earth.

4. The magnetic meridian, or magnetic north line, through a point is the straight line joining that point with the magnetic north pole; or, the magnetic meridian through a point might be defined as the straight line through the point which coincides in direction with the magnetic needle placed at that point.

Variation or Declination of the Needle:

1. The angle between the true meridian and the magnetic meridian for any place is called the "variation" or "declination" of the needle for that place. The variation is said to be "east" if the magnetic needle swings to the east of true north, and is said to be "west" if the magnetic needle swings to the west of true north.

Meridians on Maps:

1. Every complete and properly constructed map should have the true and the magnetic meridians shown and the variation indicated in degrees.

Directions on a Map:

1. The direction of a line or course on a map is usually given by giving the angle the line makes with either the true meridian or the magnetic meridian, this angle being called the azimuth of the course.

Azimuth:

1. The true azimuth of a line or course is the horizontal angle the line or course makes with true north, measured from north in a clockwise direction.

2. The magnetic azimuth of a line or course is the horizontal angle the line makes with magnetic north, measured from north in a clockwise direction; or, in other words, is the angle the line makes with the compass needle, measuring in a clockwise direction from the needle.

Methods of Orienting a Map:

1. Orienting by Compass, Magnetic Meridian Shown. Lay map on flat surface and place compass on map. Shift map until north end of magnetic meridian on map points in same direction as north end of compass needle.

2. To Orient Map When True Meridian is Given: (a) If magnetic variation is known, lay off magnetic meridian and proceed as above by compass method.

(b) If no compass is available, determine a true north and south line on the ground and point north end of true meridian on map in same direction as north end of the true north line. A true north line may be determined approximately by aid of your watch and the sun, or at night by means of the north star.

3. Orienting by Means of Known Points: No compass available and your sketch has no meridians shown. Pick out two prominent landmarks on the ground which are shown on the map and which can be easily identified. Draw a line on map joining the two points. Shift map so that line on map agrees in direction with line on ground joining the two points, the same landmarks being at the same ends of the lines on map and ground respectively.

4. Orienting by Backsighting: A method used in sketching as a check on the compass method, the principle being the same as in No. 3 above. Assume we have sketched in a line from A to B and have moved to B. Set up board and orient by sighting back at point A along the line BA.

5. Orienting by North Star: Determine true north line by means of North Star and make true meridian on map agree in direction with this line.

6. Orienting by Observation: Can be done when a number of objects on the ground can be quickly identified on the map, by shifting map so that objects on map and ground occupy same relative positions.

The Compass:

1. Directions are usually determined and followed by means of the compass, which consists of a magnetized needle free to rotate in a horizontal plane above a card graduated in degrees.

2. The aeroplane compass consists essentially of a circular disc and magnetic needle in one piece pivoted and free to revolve in a horizontal plane in a glycerine bath. This is called the Rose of the Compass. The circular disc is divided into 360 degrees, marked clockwise, 90 degrees being east, 180 degrees south and 270 degrees west and the needle always pointing to magnetic north.

3. The rim of the basin containing the glycerine bath is also divided into 360 degrees, marked counter-clockwise, 90 degrees being west and 270 degrees being east.

4. The compass is mounted on the dash board in such a way that the line passing through the 0 and 180 of the rim of the basin is parallel to, or else coincides with, the axis of the machine. This is called the lubber's line.

Deviation:

1. Deviations from proper position of compass needle are usually caused by presence of iron or an electric current near the compass.

2. Compass deviation is the horizontal angle between the magnetic meridian and the position actually taken by the compass needle. Deviation is called easterly or plus (+) when north end of the compass needle is drawn to the right of the magnetic meridian, and westerly or minus (-) when north end of the compass needle is drawn to the left of the magnetic meridian.

3. Not practical to entirely eliminate deviations. Deviations which it is not practical to compensate for, are then shown on a card as follows, which is placed in the machine near the compass.

Magnetic Bearing		Compass Error Is
N	0°	0°
NE	45°	-3°
E	90°	-1°
SE	135°	+4°
S	180°	+3°
SW	225°	+6°
W	270°	-2°
NW	315°	+2°

Compass Checked by _____ Date _____

Correcting Courses for Variation and Deviation:

1. Having given the compass course or the magnetic course, to find the true course, add easterly variation and deviation, and subtract westerly variation and deviation.

Example: Compass course 148°, variation 14° east, deviation 6° west. Find true course.

Compass course	148°
Subtract westerly deviation	+ 6°
Magnetic course	142°
Add easterly deviation	+ 14°
True course	156°

Example: Compass course 325°, variation 12° west, deviation 2° east. Find true course.

Compass course	325°
Add easterly deviation	- 2°
Magnetic course	327°
Subtract westerly variation	- 12°
True course	315°

2. Having given the true course, to find the magnetic course of compass course, add westerly variation and deviation, and subtract easterly variation and deviation.

Example: True course 207°, variation 9° east, deviation 3° west. Find magnetic and compass courses.

True course	207°
Subtract easterly variation	- 9°
Magnetic course	198°
Add westerly deviation	+ 3°
Compass course	201°

Example: True course 172°, variation 11° west, deviation 4° east. Find magnetic and compass courses.

True course	172°
Add westerly variation	+ 11°
Magnetic course	183°
Subtract easterly variation	- 4°
Compass course	179°

Sketching Methods:

1. Every man in the military service should be able to make a fair military sketch. A military sketch should show all natural and artificial features of military value in the area represented, as far as the scale and time available will permit.

2. All detail except that shown by contours is called horizontal or flat detail; that shown by contours is called vertical detail.

3. Horizontal position of any point is determined when its direction and distance from a previously determined point are shown. In sketching, the line from which directions are measured is the magnetic meridian. The board should always be oriented.

4. The position of a point as regards horizontal distance and direction is usually determined by one of the following methods:

(a) Traverse: Location by measuring the distance and direction from a known point to the point in question.

(b) Intersection: The position of a point is determined by drawing rays toward the point from two points on the sketch whose positions have already been determined. The intersection of these rays fixes the point.

(c) Resection: Resection is the determination of the sketcher's position by orienting the sketch and drawing rays toward himself from two or more points whose positions are already determined and plotted.

(d) Estimation: The position of a point may be determined by estimating its distance along a ray drawn in its direction. This method requires much practice and skill.

4. The vertical position of a point is determined when its elevation with respect to some assumed datum plane is determined.

Sketching Equipment:

1. Equipment for field sketching: drawing board, about 10" x 12"; drawing paper, pocket compass, working scale, pencil, eraser and pocket knife. If vertical detail is to be shown, an attachment should be constructed on the board for measuring slopes.

2. Protractor is an important instrument for measuring and ploting angles, but is not necessary for rapid field sketching.

Types of Sketches:

1. Military sketches may be divided into (a) Area sketches, (b) Reconnaissance sketches.

2. Area sketches, subdivided as follows: (a) Position sketch; sketch of an area to all parts of which the sketcher has access.
(b) Outpost sketch, in which the sketcher covers the ground along and in front of an outpost.
(c) Place sketch, in which the sketcher is located in one place from which he is not at liberty to move.

3. The principal types of reconnaissance sketches are Road, River and Railroad Sketches. In sketches of this type the sketcher covers a more or less definite line, furnishing as much detail as possible concerning the line and including the area within a few hundred yards on either side of the line.

Finding Your Position on the Map:

1. A person may determine his position on a map by resection, taken up previously.

2. He may also determine his position by observation, which requires considerable ability in Map Reading in order that he may always be able to identify visible landmarks.

MAP READING

SYLLABUS

Contours, Vertical Interval, Map Distance, Profiles.

Study of Topography.

1. Is study of shape of earth's surface.

2. Essential in military operations.

Drainage System - Critical Points.

1. Drainage system very important, furnishes master lines of topography

2. The formation of the country between the ridges and the streams is furnished by the contour lines.

3. Critical points are the heads, the changes in direction and changes in slope of the drainage lines; and the tops, changes in direction and changes in slope of the ridges.

4. Determine location and elevation of critical points. Fill in detail with contour lines.

Contour Lines - Definition and Purpose.

1. Definition - Contour line is an imaginary line on the earth's surface every point of which has the same elevation.

2. Shore line of a quiet pond forms a contour line.

3. Formation of shoreline at entering valleys and projecting knolls.

4. Purpose - To determine elevations and shapes of various features of earth's surface.

5. Measure of vertical distance.

Datum Plane.

1. Usually sea level; may be any arbitrarily assigned elevation.

Value of Topography to the Aviator:

1. Determination of landmarks. Recognition of topographical landmarks furnishes check on correctness of course.

2. From great altitudes country appears flat. Then study profile.

3. Assists aviator to pick good landing ground for forced landing.

Vertical (or Contour) Interval, (V.I.)

1. Vertical distance on ground between two adjacent contours.

2. Vertical interval does not change on a given map.

Choice of Vertical Interval.

1. Depends on scale of map and topography of country.

2. Flat country and large scale map use small V.I. Same country on small scale map, somewhat larger V.I.

3. Mountainous country, large V.I., depending on scale of map.

Horizontal Equivalent, (H.E.).

1. Is the horizontal ground distance between two adjacent contours. Varies with steepness of slope and V.I. used.

Map Distance, (M.D.).

1. Is the distance on the map between two adjacent contours.

2. M.D. = H.E. x R.F.

3. Varies with the slope, V.I. and R.F.

Slopes - Methods of Expressing.

1. Spacing and shape of contour lines depends upon the V.I. and upon slope of the terrain.

2. Three methods of expressing slopes:

(a) In Degrees.

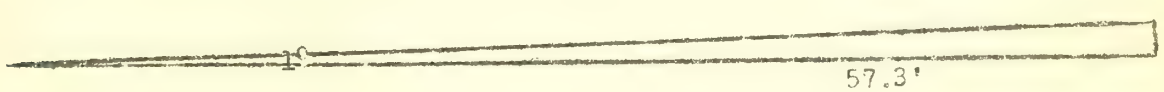
(b) In Percentage.

(c) In Gradients.

3. Degrees used in military matters.

Reference Triangle.

1. Horizontal travel of 57.3' on 1 degree slope gives vertical rise of 1 foot.



2. Importance of reference triangle in estimating Map Distances (M.D.).

3. Determination of relation between degrees of slope and slope expressed in gradients.

A 1 degree slope has 1 foot rise in (57.3' x 12) = 688" horizontal travel.
" 2 " " " " " " " 688 ÷ 2 = 344" " "
" 3 " " " " " " " 688 ÷ 3 = 299" " "
" 4 " " " " " " " 688 ÷ 4 = 172" " "
" 5 " " " " " " " 688 ÷ 5 = 138" " "

Principles or Characteristics of Contour Lines.

The following principles or characteristics of contour lines will be helpful in learning to picture topography from a contour map:

1. All points on a contour line have the same elevation above the datum plane. (Datum plane is usually sea-level.)

2. Contours near together indicate a steep slope.

3. Contours far apart indicate a gentle slope.

4. Where contours are equally spaced the slope is uniform.

5. Where contours are straight and evenly spaced, the ground is a sloping plane.

6. Every contour closes on itself or extends off the map.

7. A contour never splits.

8. Contours representing a vertical cliff lie on top of one another.

9. Contours cross only in the case of an overhanging cliff, and this is very rare.

10. On watersheds, contours are convex toward the base of the slope, the point of the V or U is toward the base of the slope.

11. In a watercourse, contours are convex toward the source of the stream, the point of the V is upstream.

12. A closed contour indicated either a hill top or a depression. A hill top is shown when the smallest closed contour is higher than the adjacent contour, and a depression is shown when the smallest closed contour is lower than the adjacent contour. Depressions are often also shown by hachure lines.

13. A saddle is shown by two contours of greater elevation on two sides of the low part of the saddle and two contours of lower elevation on the other two sides.

14. A convex slope is represented by contours farther apart at the higher elevation and getting closer together toward the base of the slope.

15. A concave slope is represented by contours closer together near the top of the hill and getting farther apart toward the base of the slope.

16. A plateau is represented by a fairly flat surface (very few contour lines) surrounded by contours showing a downward slope on all sides.

Additional Guides for Reading Topography and for Making Topographic Sketches.

1. Carefully note the position and direction of flow of all streams.

2. Contours are usually closer together near the sources of streams as streams are usually steeper near the source, although this is not always the case.

3. The larger the stream, the flatter the slope as a rule. Hence contours are usually closer together on tributaries than on the main stream.

4. Contours are always at right angles to the lines of steepest slope. They, therefore, cross the stream lines and ridge lines at right angles.

5. If one has difficulty in tracing out a particular contour, it is helpful to imagine himself walking along that contour. If he starts out with low land on his right hand, he will always have low land on his right hand as long as he walks that contour in that direction, and vice versa.

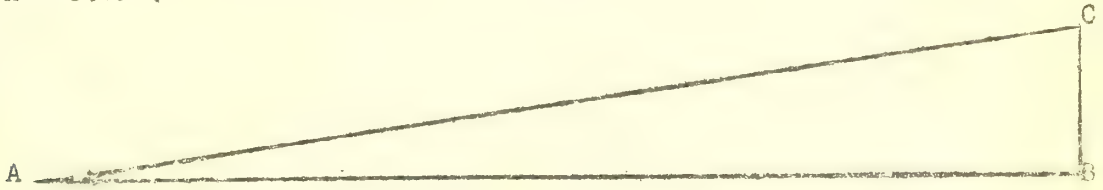
Map Distance Scales.

1. It is usually not practical to measure the horizontal distance between two points situated on a slope. It is easy, however, to measure the vertical distance between the two points and to measure the angle of the slope on which the two points are located.

2. We have seen that:

M.D. = H.E. x R.F.,
(Map Distance = Horizontal Equivalent x Representative Fraction)

3. From the "57.3 rule" in Trigonometry, referring to the triangle ABC we know that, BC = AB x R, provided BC is small compared to AB, and angle ABC is approximately 90 degrees, where R = angle BAC expressed in radians
1 Radian = 5.73°.



Hence if D equals number of degrees in angle BAC, BC = AB x $\frac{D}{57.3}$, and AB = $\frac{BC \times 57.3}{D}$. Letting AB equal Horizontal Equivalent and BC equal vertical interval, we have, H.E. = $\frac{V.I. \times 57.3}{D}$, where D equals angle of slope in degrees.

4. For a one degree slope, H.E. = V.I. x 57.3. It has been found that if we travel a horizontal distance of 57.3 up a one degree slope we will rise one foot. The above relations are not absolutely true, but for angles up to 20 degrees are so nearly correct that the error is not appreciable on the scales used on military maps.

5. From the expression M.D. = H.E. x R.F. we now have, reducing the V.I. to inches by multiplying by 12 and using the factor 688 instead of 57.3:

$$M.D. = \frac{V.I. \times 12 \times 57.3 \times R.F.}{D} = \frac{V.I. \times 688 \times R.F.}{D}$$

This formula gives the map distance in inches for various slopes (D equals degree of slope), having given the V.I. of the map and the R.F. The V.I. in the above formula will be in feet as the factor 12 for reducing it to inches is always in the equation. For example: suppose our R.F. = $\frac{1}{21,120}$ (Scale 3" to the mile), V.I., 20', and two degree slope:

$$M.D. = \frac{20 \times 688}{2} \times \frac{1}{21,120} = .325 \text{ inch.}$$

This means, that on a map having a V.I. of 20' and R.F. $\frac{1}{21,120}$, a distance of .325 inch on the map between adjacent contours represent a two degree slope on the ground.

6. It will be noted that for a given map, having the scale and vertical interval fixed, the map distance varies inversely with the degree of slope, and from this relation Map Distance scales are easily constructed. From the formula above we can obtain the following results:

M.D. for	1/2	degree slope	equals	1.30	inch.
" " "	1	" "	"	.65	"
" " "	2	" "	"	.325	"
" " "	3	" "	"	.22	"
" " "	4	" "	"	16	"
" " "	5	" "	"	13	"
			Total	2.785	"

7. From this data a map distance scale may be constructed by drawing a line 2.785" long and laying off the length to represent each degree of slope calculated.



By placing this scale on a map having a V.I. of 20' and R.F. $\frac{1}{21,120}$, and measuring the distance between two adjacent contours, the degree of slope, the practicability of various classes of military operations can be decided upon.

Normal System of Scales

1. Prescribed for U.S. Army Field Sketches.

Sketches of large areas = 1 inch = 1 mile, V.I. = 60 feet.
Road sketches ---------- 3 inches = 1 mile, V.I. = 20 feet.
Position sketches ----- 6 inches = 1 mile, V.I. = 10 feet.
Fortifications -------- 12 inches = 1 mile, V.I. = 5 feet.

2. Map Distance for given degree of slope is same on all maps of this system.

M.D. x D. - V.I. x 688 x R.F.

If M.D. x D is to remain constant, as it must under this system, the R.F. and V.I must change inversely by the same ratio on all maps of this system.

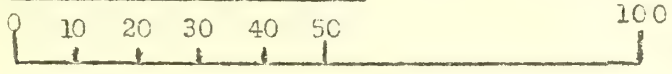
4. Under the Normal System, V.I. in feet = $\frac{60}{\text{Number of inches per mile, of the scale.}}$

Working Scale of Elevations

1. Another type of map distance scale, which might be called a working scale may be constructed as follows: As stated before, if we travel horizontally for a distance 57.3' on a one degree slope we rise one foot. 5730' horizontal travel on a one degree slope = 100' rise. 5730' = 68,760" horizontal travel on a one degree slope = 100' rise.

If now we are making a sketch at a scale of 3" = 1 mile, R.F. $\frac{1}{21,120}$, a horizontal travel of 68,760" will be represented on the sketch by a line $\frac{68,760}{21,120}$ = 3.25" long.

If this travel of 68,760" had been along a one degree slope we would have risen 100 feet. Hence on this sketch a line 3.25" long on a one degree slope represents a rise of 100 feet. If then, we lay off a line 3.25" long and divide it into 10 equal parts, each part will represent 10' rise if measured along a one degree slope.



If these distances are measured along a two degree slope, the rise represented will be twice that marked on the scale; three degree slope, three times that on the scale for a one degree slope, etc.

3. Working scales of elevations for sketches on a scale of 6" to the mile, or any other size scale, may be constructed in the same way as explained above for the scale 3" to the mile.

Map Distance Scale in Metric Units.

1. The formula for Map Distance (M.D.) as derived above is, M.D. = $\frac{\text{V.I. x 57.3 x R.F.}}{\text{D}}$, where M.D. and V.I. are in the same unit of measure. For instance, if the V.I. used in the formula is in feet, the M.D. derived will be in feet. It is more convenient to have the M.D. expressed in inches, hence the V.I. is usually reduced to inches. This is done by using the V.I. in feet, and multiplying the factor 57.3 by 12 and using the factor 688 in the formula, which is, in effect, reducing the V.I. to inches.

2. Applying metric units to the above formula we have

$$\text{M.D.} = \frac{\text{V.I. x 5730 x R.F.}}{\text{D}},$$

Where, M.D. = map distance, expressed in centimeters
V.I. = vertical interval, expressed in meters
R.F. = Representative fraction
D. = slope in degrees, (and not in the French unit, grade, which will be taken up later.)

3. Example: What is the M.D. for a two degree slope on a map having a V.I. of 5 meters and R.F. $\frac{1}{20,000}$?

$$M.D. = \frac{5 \times 5730}{2} \times \frac{1}{20,000} = \frac{28\,650}{40,000} = .71 \text{ centimeters.}$$

Profiles.

1. A profile is a drawing showing a vertical section of mapped ground.

2. Helpful to the aviator in recognizing the topography along the skyline in the distance.

3. Furnish important means of solving visibility problems.

4. Practice in drawing profiles.

PIN-POINTING

British System

1. By laying a map off in squares, it is possible to locate a target, or other point of interest, by giving the "Letter", "Number" and "Letter", respectively, of the squares containing the target, together with the coordinates of its position in the smallest lettered square. This process of locating points by means of the map squares is called "Pin-pointing".

2. The pin-point may be said to consist of four elements which may be illustrated by the pin-point G 8 b 73, as follows:-

First, the 6,000 yard square "G".
Second, the 1,000 yard square "8", which is contained in "G".
Third, the 500 yard square "b", which is contained in "8".
Fourth, the coordinates, 7 3, of the point to be located in the square "b".

3. The country is divided into large rectangles which are grouped in sets of 24, six wide and four deep, being lettered from A to X as shown in Fig. 1. The top row (A to F, inclusive) and the bottom row (A to F, inclusive) and the bottom row (S to X, inclusive) each contain six rectangles 6,000 yds. in the east and west direction by 5,000 yds. in the north and south direction. The two center rows (G to L, inclusive and M to R, inclusive) each contain six squares 6,000 yds, by 6,000 yds. Our map of Belgium covers the area in Fig. 1, outlined by the dotted lines.

4. These large lettered rectangles, A, B, C, etc., form the first element of the pin-point. For example, in Fig. 1, a point might be located in "G" as shown.

5. The large lettered rectangles are then divided into either 30 or 36 squares depending upon whether the rectangle is 5,000 yds. or 6,000 yds. deep, respectively. Fig. 2 represents the 6,000 yd. square "G" divided into 36 squares, 1,000 yds. on a side and numbered from 1 to 36.

6. These 1,000 yd. numbered squares form the second element of the pin-point. A target in square "8" in Fig. 2, would be located in G 8.

7. The 1,000 yd. squares are each subdivided into four squares 500 yds. on a side and lettered "a", "b", "c", "d", for the north-west, north-east, south-west and south-east squares respectively. Fig. 3 represents the 1,000 yd. square "8" divided into four 500 yd. squares.

8. The 500 yd. lettered squares form the third element of the pin-point and a target in the 500 yd. square "b", Fig. 3, would be located, up to this point, in G 8 b.

9. The final step is to consider the south and west sides of the 500 yd. square, in which the point is located, as coordinate axes with the origin at the southwest corner of the square. By giving the coordinates of the point in the 500 yd. square, its final position may be determined. The south and west sides of the square are divided into ten imaginary equal parts, each division being 50 yds. These divisions are numbered 0 to 9 from the point of origin, the south-west corner of the square.

10. The final element of the pin-point consists of the coordinates of the target in this 500 yd. square. The abscissa is always given first, which is the perpendicular distance east from the Y-axis (the north and south line) and, in this case, is 7. The ordinate is always given second, which is the perpendicular distance

north from the X-axis (the east and west line) and, in this case, is 3. In Fig. 3, the target shown in square "b", has the coordinates 7 3 (read seven, three, not seventy-three).

11. The complete pin-point location of the target is then G 8 by 73.

12. The coordinate "0" is used but not "10". If the point falls on a dividing line between the squares, it is located in the square in which the coordinate "10" will not be used, or, in other words, it will be considered as being in the square to the east or north. For example, the pin-point of "X" in Fig. 3 is G 8 a 50 and not G 8 c 5, 10.

13. For very exact work, each of the ten divisions along the X- and Y-axes may be imagined divided into 10 equal parts or 5 yd.. intervals. The coordinates are then expressed by giving the tenths and hundredths east of the Y-axis and the tenths and hundredths north of the X-axis. Suppose the target in Fig. 3, were moved 20 yds. east, or 4 tenths of the distance from 7 to 8. If very great accuracy were required, its pin-point would then be expressed as G 8 b 7430, (read G 8 b seventy-four - thirty). For ordinary work, however, it is sufficient to represent the point as being on the nearest 50 yd. division. It should be noted that the coordinates are represented by two figures or by four figures, never by three figures.

French System

1. The method of locating points on the French battle maps is by reference to the superimposed kilometer grid. The French system is based entirely upon the Rectangular System or Coordinates, that is, every point on the "Western Front" may be located with respect to a certain arbitrary point or origin which happens to be in central western France in the general vicinity of Poitiers.

2. This point of "origin" was chosen at the beginning of the European War, and was so chosen that the entire Western Front falls in the first quadrant, thus eliminating the positive and negative signs. According to the conventions of analytic geometry, all distances in the first quadrant are measured in positive directions along the two axes, X- and Y-.

3. The "origin" was also chosen in such a position that no point on the Western Front would be greater than 999 kilometers away, measured in an east or north direction from the two axes, thus eliminating a larger number of digits.

4. The Western Front was then divided into large blocks of land and a true meridian constructed thru the center. Parallel and perpendicular to this meridian, lines were drawn one kilometer apart. These are actual lines on the maps and are not always exactly parallel to the lines of latitude and longitude. This is due to the fact that a line parallel to a true meridian cannot itself be a true meridian except at the equator, because all meridians converge toward the poles. Hence, the further this parallel line is from its meridian and the further it runs, the greater is its deviation from true north and south. Our map of Belgium is taken from the western half of one of the large blocks spoken of above.

5. The grid lines on our Belgian map are numbered as shown in Fig. 4.

6. In doing ordinary work, the pin-point is given to one tenth of a kilometer. For example, "X" on Fig. 4 is at 2145-2896. For detail work, it may be located to one one-hundredth of a kilometer, in which case it would be at 21453-28964.

7. It should be noted that the abscissa is always given first and the ordinate second.

8. The pin-point may often be abbreviated by omitting the first figure or the first two figures from each of the coordinates. In order to keep certain information from falling into the hands of the enemy, the grid lines are often given letter designations which are changed from day to day according to an authorized key. For instance, suppose the line 214 were given the designation A and the line 289 L. The pin-point of "X" would then be A5 L6.

9. It should be noted that there are always the same number of figures in each of the coordinates. If not abbraviated, the first digit in either of the coordinates is always hundreds, the second, tens, the third, units, the fourth, tenths and the fifth (when given), hundredths. The decimal point is understood but always omitted.

10. In case a pin-point is not 100 kilometers from the point of origin, in either direction, the first digits of the coordinate would be given as zeros. For example, 0132 0051 would represent a point 13.2 km. east of the origin and 5.1 km. north of the origin.

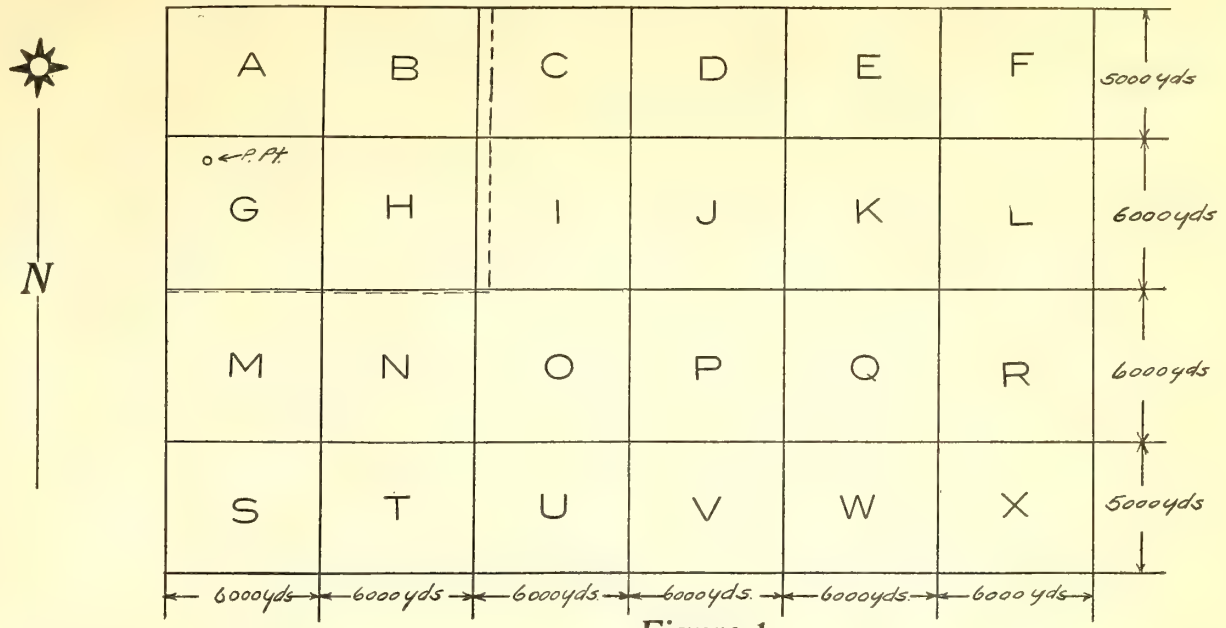


Figure 1

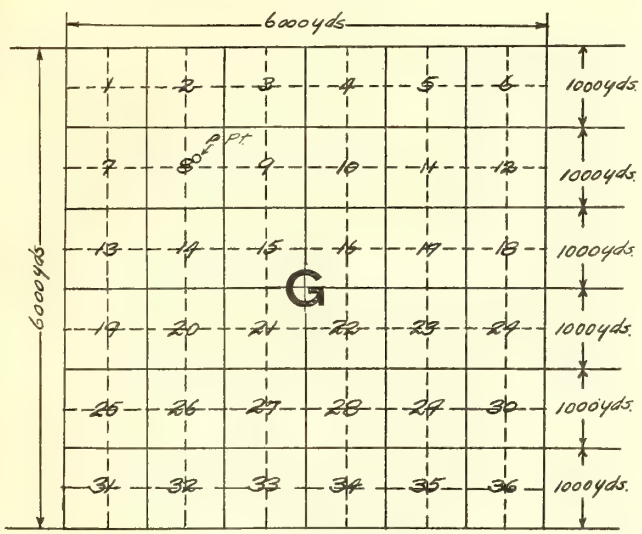


Figure 2

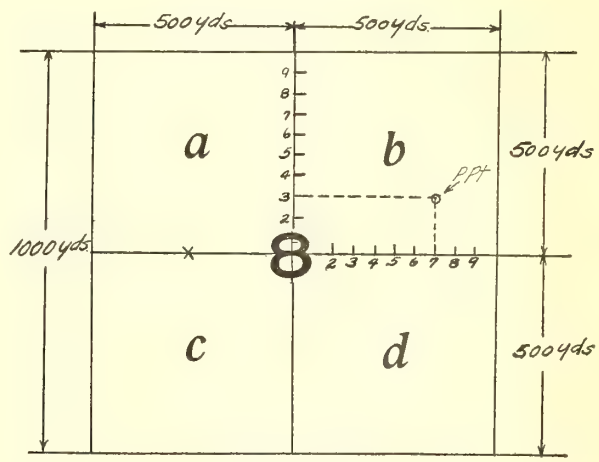


Figure 3

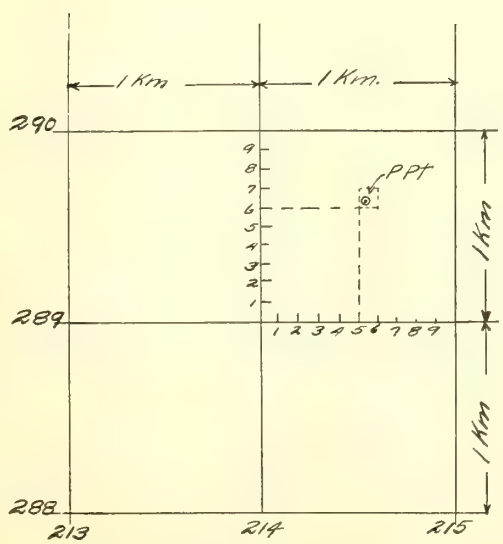


Figure 4

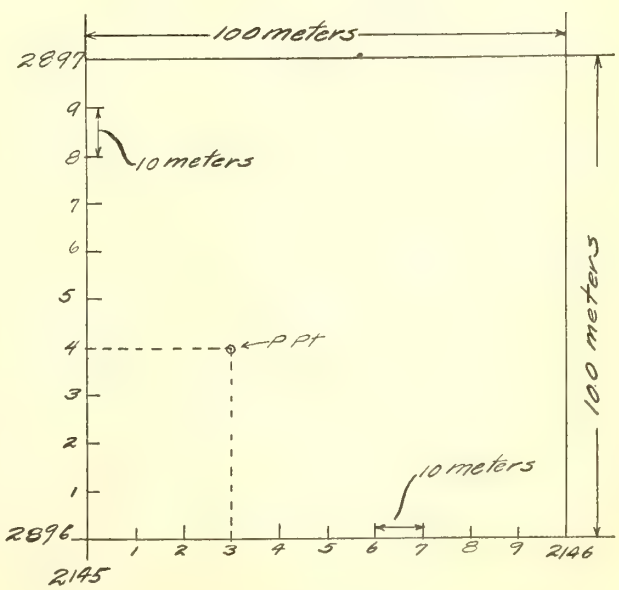


Figure 5

PROBLEMS AND EXERCISES IN MAP READING

Exercise I. Contour Map.

The problem is to draw logical contours at 20 ft. vertical intervals, upon a skeleton map which gives the complete drainage net and a few of the master critical points.

1. Locate the points where desired contours cross the main stream line, by interpolating between the given elevations.

2. By interpolation, find where the contours cross the tributary ravines.

3. Locate the points where the contours cross the ridge lines. This is done by interpolating between the critical points already located on the ridges and the points where the contours would cross the ravines.

4. Draw the contour lines thru points of the samd elevation.

Exercise II. Profile from a Contour Map.

1. A profile is a drawing showing a vertical cross-section of the mapped ground along a given line.

2. Draw a straight line thru the points where the cross-section is desired, cutting the contour lines. Let this line be known as A-B.

3. Project the points of intersection which the countours make with the line A-B onto a line drawn along the border of the map which is parallel to A-B. Call this line A'-B'.

4. Assume a vertical scale to represent the contour interval, as, 1/8" equals 20'; the horizontal scale to be the same as that of the map.

5. Draw lines parallel to A'-B', the distance apart being according to the vertical scale chosen. These lines represent the imaginary horizontal planes at equal, vertical intervals.

6. Thru the intersections which these lines make with the lines projected from A-B (the corresponding planes), the profile is drawn.

Exercise III. Construction of "Map Distance" scales.

1. A "map distance" scale somewhat resembles a graphical scale, the difference being that it reads in degrees of slope instead of in units of linear measure. With a properly constructed "map distance" scale, for a given topographic map, one can read the degrees of slope on the ground at any point by applying the scale.

2. The actual construction of these scales for a map in the English system as well as in the metric system of units of measure, is taken up in detail in the classroom. Usually a few minutes are spent in the practical application of these scales to the maps for which they are constructed.

Exercise IV. Problems on scales.

Construction of a graphical working scale.

1. A blue print showing two distances which have been measured off on the campus, is furnished to the squadron commander. One of these distances is paced off by each student in order to determine the average number of inches in his pace.

2. A scale of paces is then made for a given R.F. and later used in making a sketch on the campus.

Construction of a graphical reading scale.

3. Graphical reading scales are also constructed, which involve the use of conversion factors from the metric system to the English system and vice versa.

Exercise V. Practice in Orientation from the Moving Flight Picture.

1. The "Moving Flight Picture" represents an area 2,000 yds. wide and was painted from strips cut from our map of Belgium. The Picture was painted in perspective with the desire that it should represent the ground as viewed from an airplane flying at a low altitude, the observer looking forward. The strips from which the "Picture" was painted, represent the path which the machine traveled as it flew about, over the area represented on our map. The strips were pasted together, end to end, in such a manner as to make a continuous course except where the machine changed direction. The Moving Flight Picture was painted from this long strip, the scale of the painting being 1 to 1715.

2. In order to follow, on your map, the course which is shown as the Flight Picture moves, it is necessary to keep your map constantly oriented. This involves constant turning of your map in order to keep the course of flight on it parallel to the course shown on the picture. It is essential that an aviator know how to keep a map properly oriented when using it in the field in order that he may not get lost.

3. Road intersections, forests, villages, topography, streams and canals, together with the compass needle, should be of the greatest assistance in keeping the map oriented.

4. To check up your orientation, the picture will be stopped occasionally in order to allow you to pin-point certain objects indicated by the instructor.

Exercise VI. Problems in plotting courses from French Military Maps.

1. We have, on file, a large number of different French Military maps to each of which is attached a typewritten sheet of instructions. In the classroom, each individual is furnished with one of these maps, each map carrying with it a different problem.

2. A certain point is designated as the aerodrome. This point may be described as a pin-point, town, road intersection, or by some other means which involves a study of the map to locate it. The instructions outline a flight by

giving the azimuth or bearing (either true or magnetic) of the different courses and the distances on the ground; or, the points where the machine changes direction may be designated on the ground by certain land makrs, either natural or artificial, and the azimuths or bearings are to be found.

3. A map of the area covered by the flight is made by plotting the different courses.

Exercise VII. Out-door Sketching.

A "traverse line" is run around the Mining Building. The building is located by taking "side shots" at the different corners from the various "stations" along the traverse.

1. A small drawing board with a compass mounted on it is supplied. The scale of paces which has previously been constructed by the student is used for plotting distances on the sketch.

2. After the paper is attached to the board, an arrow, representing the magnetic meridian, is drawn on the border parallel to the side nearest the compass.

3. Station I. on the ground is chosen some 15 to 20 yds. diagonally away from one of the corners.

4. The map is then oriented by making the arrow on the paper parallel to the compass needle, after the needle has come to rest.

5. Station I. on the map is then chosen in such a position that all three corners of the building which are visible will fall within the borders of the paper and so that the building will be located near the center of the map.

6. After Station I. has been located on the map, lines are drawn to the different visible corners of the building by sighting from this point along the straight-edged scale.

7. After lines are drawn to the different visible corners, Station II. is located on the ground near the next corner of the building similar to Station I. A line is then drawn in the direction of Station II. from Station I.

8. The distance between these two stations on the ground is paced then laid off on the map according to the scale of paces, thus locating Station II. This is the first course of the traverse.

9. At Station II., the board is again oriented as at Station I. by using the compass needle and also by "back-sighting" at Station I. This latter method is used as a check and should never be neglected. Side-shots to the three visible corners are again taken. The intersection of two of these lines with two drawn from Station I. will locate two corners of the building.

10. Next locate Station III. and proceed on around the building in like manner.

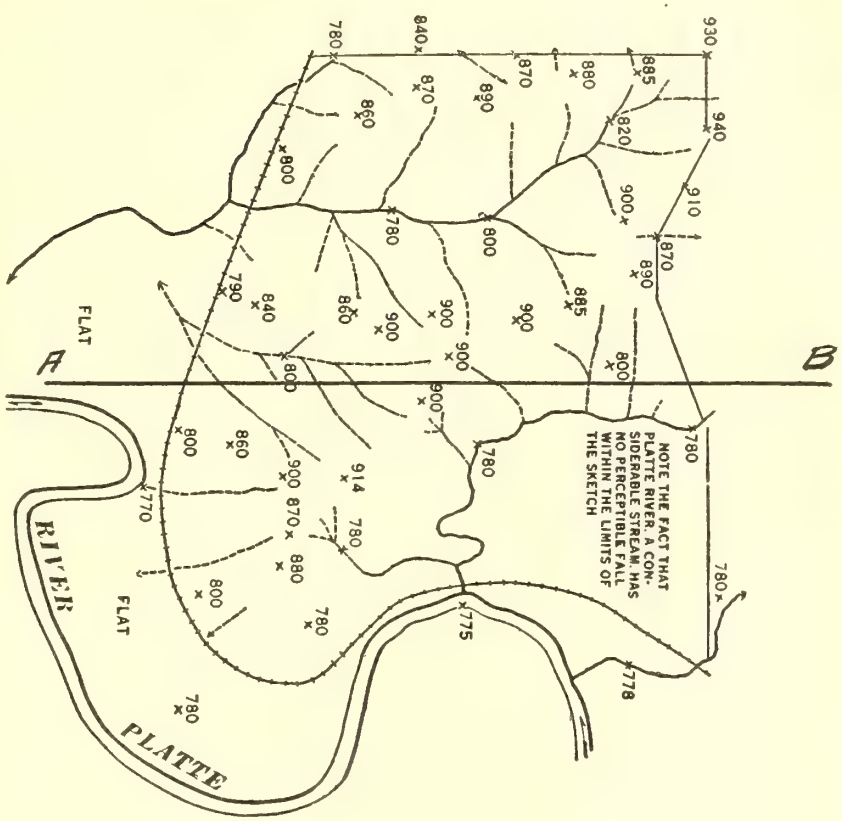
11. Upon arriving at a point where Station I. can be seen, the traverse is closed by sighting at Station I. and also pacing the distance on the ground as well as measuring it on the map. Any error, either in distance or direction, should be noted on the map at this point.

12. After completing the traverse, a true meridian is placed on the map by assuming the Magnetic Declination to be 18° E. The true azimuth and the distance in meters of each course of the traverse are to be shown.

13. The map should show also the three methods of representing scales and should contain a title which is usually placed in the southeast corner of the sketch.

*Name*_____

*Date*_____



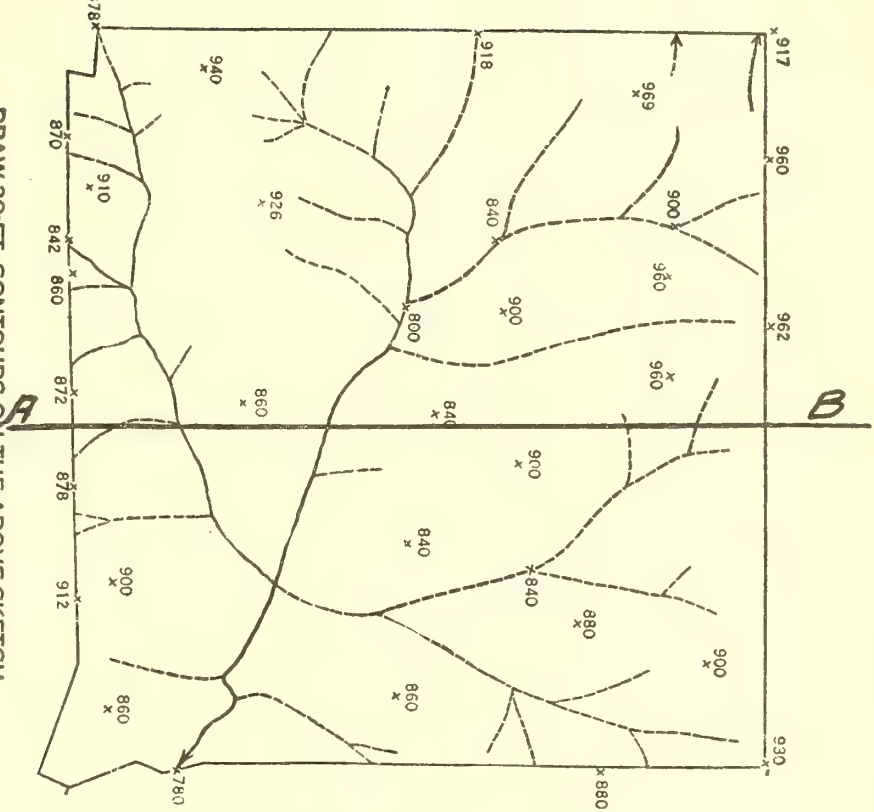
DRAW 20-FT. CONTOURS ON THE ABOVE SKETCH

LOWEST CONTOUR 780

A' *B'*

Profile

*Date*_____



DRAW 20-FT CONTOURS ON THE ABOVE SKETCH

LOWEST CONTOUR 780

A' *B'*

Profile

APPENDIX L1.

Contains the following:

Numerical Data-Entered, Relieved, Graduated and Demoted-by Squadrons by Weeks.
(13 pages)

School of Military Aeronautics - Berkeley

Appendix -.

Entered, Relieved, Graduated and Demoted by Squadrons by Weeks.

* * *

Week Beginning Monday

Sqd.	5-21-17 Sqd. No.	No.	Rel.	Dem.	5-28-17 Sqd. No.	No.	Rel.	Dem.	6-4-17 Sqd. No.	No.	Rel.	Dem.	6-11-17 Sqd. No.	No.	Rel.	Dem.
A	1	16	-	-	2	25	-	-	3	25	-	-	4	25	-	-
B	-	--	-	-	1	25	-	-	2	26	-	-	3	25	-	-
C	-	--	-	-	-	--	-	-	1	25	-	-	2	26	-	-
D	-	--	-	-	-	--	-	-	-	--	-	-	1	25	-	-
E	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-
F	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-
G	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-
H	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-
In reserve							7	-	-	24	--	-		53	-	-
Totals for week		16	0	0		57	0	6		100	-	24		154	-	53
Entered		16				*41				43				54		
Relieved		--				--				--				--		
Graduated		--				--				--				--		

* 9 men entering in 2nd week were assigned to B1.

Week Beginning Monday

Sqd.	6-18-17 Sqd. No.	No.	Rel.	Dem.	6-25-17 Sqd. No.	No.	Rel.	Dem.	7-2-17 Sqd. No.	No.	Rel.	Dem.	7-9-17 Sqd. No.	No.	Rel.	Dem.
A	5	25	-	-	6	26	-	4	7	27	-	-	8	26	-	-
B	4	25	-	-	5	25	-	-	6	22	2	-	7	23	1	-
C	3	35	-	-	4	25	-	-	5	27	1	-	6	34	-	-
D	2	26	-	-	3	35	1	-	4	25	1	-	5	26	-	-
E	1	25	1	-	2	26	-	-	3	34	-	-	4	24	-	-
F	-	--	-	-	1	24	-	-	2	26	-	-	3	34	-	-
G	-	--	-	-	-	--	-	-	1	24	-	-	2	26	1	-
H	-	--	-	-	-	--	-	-	-	--	-	-	1	24	-	-
In reserve	43				18				8	#8						
Totals for week		179	1	-		179	1	0		193	12	0		207	2	0
Entered		*25				1				13				26		
Relieved		1				1				12				2		
Graduated		0				0				0				24		

* 10 men entering this week were assigned to C5.
\# 8 men relieved from instruction, final discharges obtained later.

C5 Includes two men who were transferred from B6, not included in B6 roll.
C6 Includes 4 men transferred from A7.

Appendix_____.

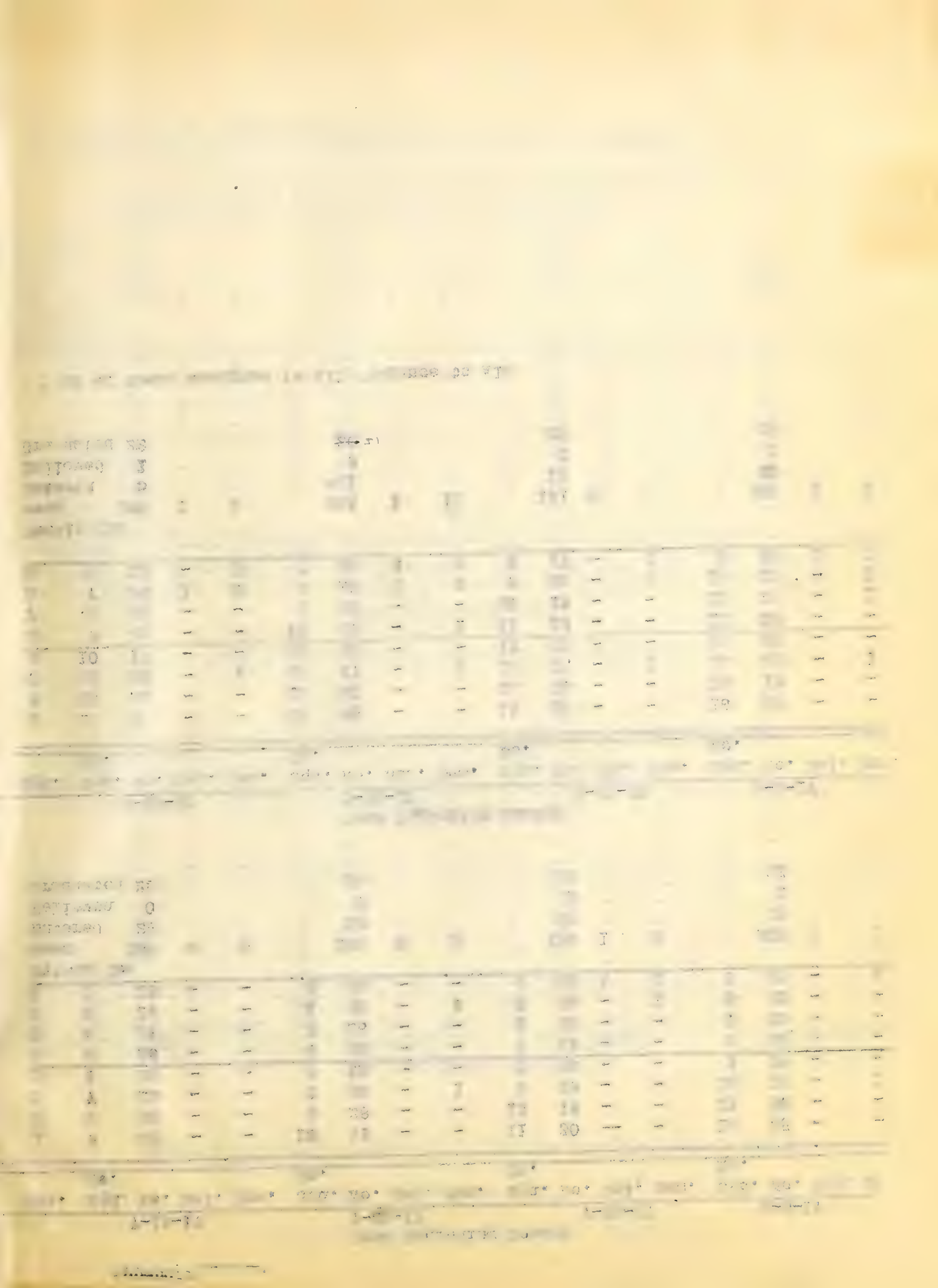
Week Beginning Monday

Sqd.	7-16-17 Sqd. No.	No.	Rel.	Dem.	7-23-17 Sqd. No.	No.	Rel.	Dem.	7-30-17 Sqd. No.	No.	Rel.	Dem.	8-6-17 Sqd. No.	No.	Rel.	Dem.
A	9	28	-	-	10	19	-	-	11	30	-	-	12	25	-	-
B	8	26	-	-	9	28	-	-	10	19	-	-	11	30	-	-
C	7	22	-	-	8	26	-	1	9	29	-	-	10	19	-	1
D	6	24	-	-	7	22	-	-	8	25	-	-	9	29	-	-
E	5	25	-	-	6	24	-	-	7	22	-	-	8	25	-	-
F	4	24	-	-	5	26	-	-	6	24	-	-	7	22	-	-
G	3	34	-	-	4	24	-	2	5	28	-	1	6	25	-	-
H	2	25	-	-	3	34	-	-	4	22	1	1	5	27	-	4
Totals for week		209	0	0		204	0	3		199	1	2		202	0	5
Entered		28				19				30				25		
Relieved		0				0				1				0		
Graduated		25				34				20				23		

Week Beginning Monday

Sqd.	8-13-17 Sqd. No.	No.	Rel.	Dem.	8-20-17 Sqd. No.	No.	Rel.	Dem.	8-27-17 Sqd. No.	No.	Rel.	Dem.	9-3-17 Sqd. No.	No.	Rel.	Dem.
A	13	5	-	-	14	26	-	-	15	12	-	-	16	20	-	-
B	12	26	-	-	13	20	-	-	14	26	-	-	15	12	-	-
C	11	30	-	1	12	27	-	2	13	22	-	2	14	28	-	1
D	10	19	-	-	11	29	-	-	12	25	-	-	13	20	-	-
E	9	29	-	-	10	19	-	1	11	29	-	-	12	25	-	-
F	8	25	-	-	9	29	-	-	10	18	-	-	11	29	-	1
G	7	26	1	2	8	29	1	3	9	32	-	1	10	20	-	1
H	6	25	-	3	7	26	4	2	8	27	-	2	9	33	2	2
Totals for week		185	1	6		205	5	10		191	0	5		187	2	5
Entered		5				*41				12				20		
Relieved		1				5				0				2		
Graduated		22				~~20~~ 21				25				29		

* 15 of these assigned to B17, balance to A14.



Appendix_____.

Week boginning Monday

Sqd.	9-10-17 Sqd. No.	No.	Rel.	Dem.	9-17-17 Sqd. No.	No.	Rel.	Dem.	9-24-17 Sqd. No.	No.	Rel.	Dem.	10-1-17 Sqd. No.	No.	Rel.	Dem.
A	17	51	-	17	18	30	1	-	19	38	4	-	20	27	1	-
B	16	20	-	3	17	37	3	4	18	36	-	4	19	38	-	10
C	13	13	-	4	16	20	-	4	17	27	-	-	18	30	-	2
D	14	27	-	1	15	10	-	-	16	20	-	-	17	30	-	-
E	13	20	-	-	14	27	1	-	15	10	-	-	16	20	1	-
F	12	25	-	-	13	20	-	-	14	26	-	-	15	11	1	-
G	11	29	-	3	12	28	2	2	13	22	2	1	14	28	3	1
H	10	21	3	3	11	29	1	7	12	30	1	5	13	23	1	4
Totals for week-		206	3	31		201	8			209	7	10		207	7	17
Entered		51				13				38				27		
Relieved		3				8				7				7		
Graduated		15				21				24				18		

Week beginning Monday

Sqd.	10-8-18 Sqd. No.	No.	Rel.	Dem.	10-15-18 Sqd. No.	No.	Rel.	Dem.	10-22-18 Sqd. No.	No.	Rel.	Dem.	10-29-18 Sqd. No.	No.	Rel.	Dem.
A	21	46	-	-	22	30	-	-	23	70	-	-	24	47	-	-
B	20	38	1	7	21	53	4	17	22	47	-	-	23	70	1	-
C	19	26	-	3	20	34	1	1	21	32	1	-	22	49	4	4
D	18	28	-	-	19	34	-	-	20	32	-	-	21	29	-	-
E	17	30	-	-	18	28	-	-	19	24	-	-	20	32	1	-
F	16	20	-	-	17	30	-	-	18	29	-	-	19	24	-	-
G	15	11	-	-	16	23	2	6	17	35	3	-	18	31	4	7
H	14	27	2	7	15	15	-	3	16	18	3	2	17	32	1	5
Totals for week -		228	3	17		237	7	27		287	6	2		314	11	16
Entered		46				30				70				47		
Relieved		2				7				6				11		
Graduated		18				12				14				26		

| | | |

Appendix ___.

Week Beginning Monday

	11-5-17				11-12-17				11-19-17				11-26-17			
Sqd.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.
A	25	60	—	—	26	38	—	—	27	54	—	—	28	71	—	—
B	24	48	2	—	25	60	2	—	26	38	2	—	27	55	1	1
C	23	74	5	5	24	51	5	5	25	63	6	4	26	40	1	3
D	22	40	—	1	23	64	—	—	24	42	—	—	25	54	—	—
E	21	29	—	—	22	38	—	1	23	65	—	—	24	40	—	—
F	20	32	1	—	21	30	—	6	22	45	1	11	23	77	—	8
G	19	31	1	3	20	33	4	5	21	26	—	—	22	32	—	—
H	18	24	—	3	19	30	1	3	20	28	1	—	21	27	1	6
Totals for week		338	9	12		344	12	20		361	10	15		396	3	18
Entered		60				38				54				71		
Relieved		9				12				10				3		
Graduated		21				26				27				20		

Week Beginning Monday

	12-3-17				12-10-17				12-17-17				12-24-17			
Sqd.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.
A	29	66	1	—	30	76	—	3	31	78	—	2	V			
B	28	73	—	—	29	65	1	2	30	75	1	3	A			
C	27	54	6	2	28	75	3	11	29	72	2	8	C			
D	26	36	—	—	27	46	—	—	28	61	—	1	A			
E	25	55	—	1	26	36	—	1	27	47	—	4	T			
F	24	47	3	5	25	58	7	3	26	38	1	7	I			
G	23	70			24	40	—	—	25	48	—	—	O			
H	22	37	1	13	23	82	3	18	24	58	1	6	N.			
Totals for week		438	11	21		478	14			477	5	31				
Entered		66				76				75						
Relieved		11				14				5						
Graduated		23				61				51						

| | | |

Appendix ___

Week Beginning Monday

Sqd.	12-31-17 Sqd. No.	Rel.	Dem.	1-7-18 Sqd. No.	Rel.	Dem.	1-14-18 Sqd. No.	Rel.	Dem.	1-21-18 Sqd. No.	Rel.	Dem.
A	V			32 80	-	-	33 87	-	15	34 47	-	-
B	A			31 78	2	-	32 81	1	--	33 72	-	-
C	C			30 79	5	3	31 77	4	8	32 130	6	14
	A											
D	T			29 63	-	-	30 75	-	-	31 93	1	-
E	I			28 64	-	-	29 63	-	-	30 111	2	-
F	O			27 50	4	8	28 71	4	7	29 92	8	3
G	N			26 30	1	-	27 39	-	1	28 97	-	-
H				25 54	2	8	26 35	-	4	27 42	1	11
Sick leave				1								
Totals for week				499	14	19	528	9	35	684	18	28
Entered				73			86		From Ohio	188		
										7		
Relieved				14			9			18		
Graduated				44			31			30		

Ohio men assigned as follows:

Sqd. A34 - 25	Sqd. E30 - 36
C32 - 41	F29 - 22
D31 - 28	G28 - 36
	188

Week Beginning Monday

Sqd.	1-28-18 Sqd. No.	Rel.	Dem.	2-4-18 Sqd. No.	Rel.	Dem.	2-11-18 Sqd. No.	Rel.	Dem.	2-18-18 Sqd. No.	Rel.	Dem.
A	36 67	-	-	37 64	-	-	38 68	-	-	39 78	-	-
B	35 48	-	-	36 67	-	-	37 65	-	3	38 71	-	4
C	34 85	2	24	35 75	10	12	36 78	6	7	37 67	3	14
CX	33 69	-	-	34 58	-	-	35 54	-	-	36 64	-	-
D	32 41	-	-	33 70	-	3	34 59	-	3	35 59	1	2
E	31 92	-	2	32 41	-	2	33 70	1	1	34 57	-	6
F	30 112	6	9	31 100	7	13	32 51	1	5	33 72	2	13
G	29 81	-	1	30 98	-	3	31 82	-	4	32 49	-	9
H	28 107	3	32	29 112	5	26	30 121	4	22	31 99	4	8
Totals for week	702	11	68	685	22	59	648	12	45	616	10	56
Entered	67			64			58			78		
Relieved	11			22			12			10		
Graduated	72			81			95			87		

Sqd. CX-34 formed from Berkeley men in Sqd. C-32. Ohio men in C-32 were advanced to D-32.

| | | |

Appendix___

Week beginning Monday

Sqd.	3-25-18 Sqd. No.	Rel.	Dem.	3-4-18 Sqd. No.	Rel.	Dem.	3-11-18 Sqd. No.	Rel.	Dem.	3-18-18 Sqd. No.	Rel.	Dem.
A	40 *77	-	-	41 #71	-	-	42 76	1	1	43 72	-	2
B	39 82	1	4	40 79	-	1	41 72	1	-	42 74	-	1
C	38 83	10	19	39 95	5	18	40 96	7	16	41 90	11	1
CX	37 50	-	-	38 56	-	1	39 72	-	-	40 71	2	-
D	36 66	-	4	37 53	-	4	38 57	-	4	39 76	-	2
E	35 61	-	12	36 75	-	4	37 54	-	1	38 56	-	-
F	34 63	5	6	35 53	5	4	36 76	4	10	37 60	5	6
G	33 66	-	2	34 56	-	2	35 46	-	4	36 66	-	1
H	32 48	1	10	33 72	1	10	34 64	1	15	35 58	6	10
Totals for week -	596	17	57	610	11	42	613	14	51	625	24	23
Entered	76			70			76			71		
Relieved	17			11			14			24		
Graduated	37			61			48			42		

*Includes 1 man demoted from B-38
#Includes 1 man demoted from B-39

Week beginning Monday

Sqd.	3-25-18 Sqd. No.	Rel.	Dem.	4-1-18 Sqd. No.	Rel.	Dem.	4-8-18 Sqd. No.	Rel.	Dem.	4-15-18 Sqd. No.	Rel.	Dem.
A	44 87	-	-	45 [illegible]	1	-	46 *89	-	1	47 [illegible]	-	-
B	43 71	-	2	44 69	-	1	45 89	-	-	46 [illegible]	2	1
C	42 74	-	4	43 74	3	2	44 71	-	3	45 [illegible]	1	1
D	40 152	1	-	42 69	2	1	43 69	1	16	44 [illegible]	3	6
E	39 72	-	1	40 152	1	-	42 [illegible]	-	5	43 57	-	1
F	38 62	3	4	39 74	7	12	40 163	7	15	42 60	-	4
F(old)										41 15	-	-
G	37 51	1	1	[illegible]	-	1	39 [illegible]	-	2	40 143	-	3
H	36 75	-	15	37 64	-	8	38 63	-	9	39 [illegible]	-	5
Sick leave				1			1			1		
Totals for week -	624	4	27	599	14	25	567	8	51	547	6	21
Entered	65			40			38			45		
Relieved	5			14			8			6		
Graduated	60			18			54			59		

*Contains 1 man demoted from B-44

| | | |

Appendix_____.

Week Beginning Monday

Sqd.	4-22-18 Sqd. No.	No.	Rel.	Dem.	4-29-18 Sqd. No.	No.	Rel.	Dem.	5-6-18 Sqd. No.	No.	Rel.	Dem.	5-13-18 Sqd. No.	No.	Rel.	Dem.
A	46	41	—	2	49	41	—	—	50	39	—	1	51	84	—	—
B	47	46	—	1	48	40	1	1	49	41	—	2	50	40	—	—
C	46	34	—	1	47	46	—	2	48	40	1	5	49	44	1	3
D	45	48	—	8	46	40	3	3	47	47	—	6	48	39	1	6
E	44	76	—	3	45	44	2	2	46	36	—	1	47	42	—	5
F	43	60	2	3	44	75	2	3	45	44	—	5	46	40	2	5
G	42	56	—	10	43	65	—	4	44	73	—	5	45	43	—	6
G-old	41	20	—	1	—	—	—	—	—	—	—	—	—	—	—	—
H	—	—	—	—	42	46	—	6	43	67	—	7	44	75	2	6
*H	40	145	3	19	41	38	8	9	41	9	1	1	—	—	—	—
I	—	—	—	—	—	—	—	—	42	40	—	2	43	62	—	3
I	—	—	—	—	40	62	—	—	41	21	—	—				
K_3	—	—	—	—	—	—	—	—	—	—	—	—	42	15		
K_2	—	—	—	—	—	—	—	—	—	—	—	—	42	14	—	2
K_1	—	—	—	—	—	—	—	—	—	—	—	—	42	12	—	1
Sick leave	2				2											
Totals for week	528	5	48		499	16	30		457	2	35		510	6	37	
Entered	40				39				37				83			
Relieved	5				16				2				6			
Graduated	60				62				28				11			

H-40 60 men graduate
I-40 62 " "
I-41 21 " "
H-41 7 " "
K-42 Sect.1 11 men graduate.

| | | |

Appendix_____

Week beginning Monday

Sqd.	5-20-18 Sqd. No.	Rel.	Dem.	5-27-18 Sqd. No.	Rel.	Dem.	6-3-18 Sqd. No.	Rel.	Dem.	6-10-18 Sqd. No.	Rel.	Dem.
	Sq.			Sq.			Sq.			Sq.		
A	52	85	- 3	53	87	- 1	54	86	- 2	85	87	- 4
B	51	84	- 6	52	91	2 9	53	93	3 7	54	93	1 4
C	50	43	- 4	51	91	1 4	51	85	1 3	53	87	1 5
D	49	47	2 6	53	47	5 3	51	76	2 8	49	91	4 13
E	43	36	- 5	49	43	- 3	50	43	- -	51	86	- 3
F	47	41	1 4	43	36	- -	49	39	- -	50	48	- 2
G	46	39	- 2	47	37	1 -	43	35	- 3	49	41	1 -
H	45	44	2 3	46	41	1 -	47	36	- 4	48	37	- 2
I	44	63	- 1	45	39	- 1	46	41	- -	47	31	- 2
K	43	61	- 6	44	74	- 7	45	45	3 3	46	44	- 1
L2	42	13	- -	43	55	1 9	44	76	1 3	45	43	1 2
L1	42	13	- -	-	-	- -	-	-	- -	-	-	- -
K				42	13	- 1	43	46	- 4	44	74	- 7
Totals for week		575	6 43		641	11 38		702	10 34		732	9 47
Entered		55			55			55			55	
Relieved		6			11			10			9	
Graduated		13			12			44			67	

Week beginning Monday

Sqd.	6-17-18 Sqd. No.	Rel.	Dem.	6-24-18 Sqd. No.	Rel.	Dem.	7-1-18 Sqd. No.	Rel.	Dem.	Sqd. No. Rel. Dem.
	Sq.			Sq.			Sq.			Sq.
A	56	91	- 2	57	87	- 2	59	87	- 2	
B	55	88	- 1	56	91	- 2	57	87	1 2	
C	54	91	1 3	55	90	2 4	56	93	1 5	
D	53	94	5 5	54	93	- 7	55	91	5 10	
E	52	75	- 4	53	89	1 5	54	92	2 3	
F	51	68	- 1	52	73	- 1	53	83	- -	
G	—	—	- -	—	—	- -	52a	56	- -	
H	50	40	- -	51	65	- -	52	59	- -	
I	49	42	2 1	50	41	1 1	51	65	- 4	
K	48	37	- 3	49	42	- 2	50	40	- -	
L	47	30	- -	48	34	1 -	49	45	- -	
L	46	48	1 2	47	33	1 3	48	37	- -	
K	45	46	- 4	46	48	- 3	47	29	1 4	
Totals for week		744	9 26		753	7 32		816	10 29	
Entered		57			55			55		
Relieved		9			7			10		
Graduated		43			43			24		

Appendix____

Week beginning Monday

Sqd.	7-8-18 Sqd. No.	No.	Rel.	Dem.	7-15-18 Sqd. No.	No.	Rel.	Dem.	7-22-18 Sqd. No.	No.	Rel.	Dem.	7-29-18 Sqd. No.	No.	Rel.	Dem.
A	59	87	1	3	60	89	-	2	61	78	-	-	62	-	-	-
B	58	87	-	2	59	85	1	2	60	89	-	4	61	82	-	-
C	57	87	-	1	58	86	-	-	59	83	-	3	60	87	-	2
D	56	99	6	12	57	98	8	6	58	91	1	7	59	87	3	5
E	55	79	-	2	56	83	-	2	57	66	-	2	58	67	-	2
F	54	88	-	1	55	78	-	5	56	86	1	3	57	86	-	1
FX	53	83	-	2	54	89	-	1	55	77	-	1	56	82	-	1
G	52a	56	-	2	53	83	-	3	54	91	2	2	55	75	-	1
H	52	39	1	2	52a	35	-	2	53	82	4	12	54	99	1	2
I	51	62	-	1	52	38	-	-	52a	32	-	-	53	66	-	2
K	50	40	1	2	51	63	-	-	52	38	-	-	52a	32	-	4
L	49	40	-	3	50	40	1	-	51	63	1	4	52	42	2	2
M	48	41	-	0	49	45	-	5	50	44	1	6	51	64	-	3
Totals for week -		868	9	41		912	10	26		940	10	44		889	6	25
Entered		85				86				76				-		
Relieved		9				10				10				6		
Graduated		33				40				37				61		

Week beginning Monday

Sqd.	8-5-18 Sqd. No.	No.	Rel.	Dem.	8-12-18 Sqd. No.	No.	Rel.	Dem.	8-19-18 Sqd. No.	No.	Rel.	Dem.	8-26-18 Sqd. No.	No.	Rel.	Dem.
A	63	-	-	-	64	13	1	-	65	35	-	-	66	32	-	-
B	62	-	-	-	63	-	-	-	64	12	-	-	65	35	-	-
C	61	90	2	13	62	56	1	-	63	18	-	-	64	12	1	1
D	60	86	-	37	61	74	1	17	62	35	2	1	63	19	2	1
E	59	80	1	1	60	50	-	-	61	56	-	1	62	33	-	-
F	58	85	-	2	59	80	2	8	60	58	2	3	61	56	4	4
FX	57	86	-	3	58	88	-	1	59	71	-	-	60	53	-	-
G	56	82	-	2	57	85	-	3	58	87	-	2	59	74	2	-
H	55	76	1	3	56	83	-	3	57	85	-	4	58	69	2	10
I	54	97	-	1	55	73	1	2	56	82	1	-	57	81	-	2
K	53	68	-	7	54	102	3	11	55	81	1	9	56	90	2	2
L	52a	30	1	2	53	62	1	3	54	91	-	2	55	73	1	6
M	52	41	-	5	52a	32	-	4	53	62	-	7	54	96	1	14
Totals for week -		821	5	76		776	10	62		773	6	29		748	11	40
Entered		-				-				35				32		
Relieved		5				10				6				11		
Graduated		36				28				55				81		

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Appendix ___.

Week Beginning Monday

Sqd.	9-2-18 Sqd. No.	No.	Rel.	Dem.	9-9-18 Sqd. No.	No.	Rel.	Dem.	9-16-18 Sqd. No.	No.	Rel.	Dem.	9-23-18 Sqd. No.	No.	Rel.	Dem.
A	67	33	--	--	68	33	--	--	69	29	--	--	70	27	--	--
B	66	32	--	1	67	34	1	1	68	34	--	--	69	29	--	1
C	65	36	--	1	66	32	3	--	67	31	--	1	68	35	--	1
D	64	11	--	--	65	35	--	5	66	34	4	6	67	37	3	3
E	63	16	--	--	64	11	--	1	65	31	--	--	66	25	--	--
F	62	37	2	3	63	18	2	2	64	12	1	1	65	32	--	2
FX	61	54	--	--	62	32	--	1	63	15	--	--	64	10	--	--
G	60	53	--	--	61	54	--	1	62	32	--	1	63	16	--	--
H	59	82	2	5	60	58	2	5	61	58	--	3	62	34	1	4
I	58	79	--	1	59	76	--	4	60	55	1	2	61	57	--	--
K	57	81	1	--	58	79	1	1	59	73	1	2	60	54	--	2
L	56	92	--	5	57	85	--	1	58	77	--	--	59	70	1	6
M	55	80	--	11	56	98	2	5	57	89	--	10	58	87	2	7
Totals for week		686	5	27		644	11	27		570	7	26		513	7	26
Entered		32				33				29				27		
Relieved		5				11				7				7		
Graduated		69				91				79				78		

Week Beginning Monday

Sqd.	9-30-18 Sqd. No.	No.	Rel.	Dem.	10-7-18 Sqd. No.	No.	Rel.	Dem.	10-14-18 Sqd. No.	No.	Rel.	Dem.	10-21-18 & Sqd. No.	No.	Rel.	Dem.
A	71	23	1	--	72	14	--	2	73	24	--	1	74	54	--	11
B	70	28	1	1	71	23	--	1	72	15	--	2	73	25	1	3
C	69	30	1	1	70	27	2	2	71	24	1	3	72	16	1	2
D	68	37	1	5	69	33	3	5	70	27	1	8	71	29	2	8
E	67	31	--	2	68	33	--	1	69	27	1	6	70	24	1	2
F	66	27	--	4	67	33	1	3	68	35	2	4	69	24	--	6
FX	65	31	--	--	66	23	--	--	67	29	--	--	68	29	--	6
G	64	10	--	--	65	31	--	2	66	25	--	1	67	30	--	9
H	63	19	2	5	64	15	1	1	65	30	--	1	66	25	--	6
I	62	29	--	2	63	14	1	--	64	14	--	1	65	30	--	5
K	61	59	--	1	62	28	--	2	63	16	--	--	64	14	1	5
L	60	58	--	3	61	61	--	3	62	29	1	3	63	19	--	6
M	59	70	1	4	60	59	2	7	61	65	--	5	62	30	--	13
Sick Leave.										1						
Totals for week		452	7	28		394	10	29		361	6	35		349	6	82
Entered		23				14				23				53		
Relieved		7				10				6				6		
Graduated		65				50				60				17		

| | | |

Appendix_____.

Week Beginning Monday

	10-28-18				11-4-18				11-11-18				11-18-18			
Sqd.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.
A	75	53	1	7	76	40	-	7	77	48	-	3	78	22	-	-
B	74	49	-	7	75	51	-	7	76	55	2	7	77	59	-	8
C	73	23	-	1	74	42	3	7	75	46	-	16	76	47	3	10
D	72	20	1	7	73	29	-	8	74	32	-	6	75	30	1	4
E	71	23	-	4	72	36	-	2	73	25	-	2	74	26	-	-
F	70	27	2	5	71	23	-	3	72	15	-	2	73	25	-	2
FX	69	24	-	3	70	23	1	-	71	20	-	-	72	13	-	-
G	68	33	-	8	69	38	-	2	70	24	-	2	71	21	-	2
M	67	27	1	3	68	27	-	3	69	28	-	-	70	22	-	-
I	66	26	-	3	67	26	-	1	68	25	-	2	69	30	-	-
K	65	28	-	5	66	29	-	3	67	28	-	2	68	25	-	1
L	64	14	1	3	65	25	-	1	66	26	-	3	67	29	4	2
M	63	36	1	11	64	21	-	4	65	28	-	5	66	28	3	2
Totals for week		573	7	68		380	4	48		400	2	50		377	11	31
Entered		42				33				41				4		
Relieved		7				4				2				11		
Graduated		14				17				23				23		

Appendix ___.

Week Beginning Monday

	11-25-18				12-2-18				12-9-18				12-16-18			
Sqd.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.	Sqd. No.	No.	Rel.	Dem.
A	—	—	—	—												
B	78	32	17	—												
C	77	63	23	8	78	22	4	3								
D	76	39	14	4	77	36	1	3	78	21	8	—				
E	75	24	9	—	76	21	1	—	77	32	2	—	78	13	—	—
F	74	26	6	—	75	13	4	—	76	20	—	1	77	31	—	2
FX	73	23	7		—	—	—	—	—	—	—	—	—	—	—	—
G	—	—	—	—	74	22	—	1	75	10	—	—	76	19	—	1
G	72	15	4	1	73	16	3	—	—	—	—	—	—	—	—	—
H	71	20	6	—	72	12	1	—	74	15	—	—	75	10	1	—
I	70	22	2	—	71	13	—	—	72	23	4	—	74	15	—	1
K (Grad.)	69	30	4	3	70	26	—	4	71	17	1	4	72	23	—	1
L (Grad.)	68	26	—	—	—	—	—	—								
M (Grad.)	67	25	2	2	—	—	—	—								
H(Obs)									74	6	—	—				
Totals for week		345	94	18		181	14	11		145	15	5		111	1	5
Entered		*1				—				—				—		
Relieved		94				14				15				—		
Graduated		70				22				18				22		

*Assigned to B Sqd.

K-69 6 men requested discharge after graduation.
K-70 2 men " " " " .
K-71 4 men " " " " .
K-74(Obs). 1 man " " " " .
K-72 2 men " " " " .

Appendix

Week Beginning [illegible]

	12-23-12				12-30-12				1-6-13				1-13-13			
	Sqd. No.	Sqd. No.	Tel. No.	Dem. No.	Sqd. No.	Sqd. No.	Tel. No.	Dem. No.	Sqd. No.	Sqd. No.	Tel. No.	Dem. No.	Sqd. No.	Sqd. No.	Tel. No.	Dem. No.
F	V				V				78	16	2	-	-	-	-	-
G	A				A				77	30	-	-	78	13	4	
H	J				J				77	13	1	-	77	30	-	-
I	I	J			I	J			78	10	-	2	78	13	-	1
K		S				S			78	15	-	2	78	15	-	2
Totals for week									83	3	4		72	4	3	
Entered									-				-			
Relieved									3				4			
Graduated									13				3			

Week Beginning [illegible]

	1-20-13					1-27-13				
	Sqd. No.	Sqd. No.	Tel. No.	Dem. No.		Sqd. No.	Sqd. No.	Tel. No.	Dem. No.	
I	77	40	-	-		-	-	-	-	
K	76	20	1	-		77	[illegible]	-	-	
Totals for week		80	1	-		40	-	-	-	
Entered		-				-				
Relieved		1				-				
Graduated		19				40				



APPENDIX L2.

Contains the following:

Alphabetical List of Graduates from the
School of Military Aeronautics, Berkeley, California.

(44 pages)

Appendix _____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Aaron, David J.	H-39	4/20/18	Anderson, Clarence	H-26	1/19/18
Abernathy, Louis V.	K-74	1/11/19	Anderson, Fay T.	M-61	10/19/18
Ables, Willard C.	M-46	6/8/18	Anderson, George A.	M-55	9/7/18
Abrahamson, Lyle	M-58	9/28/18	Anderson, Howe	M-57	9/21/18
Ackley, Blaine	M-60	10/12/18	Anderson, Irwin O.	M-55	9/7/18
Adams, Arthur A.	M-50	7/27/18	Anderson, Leland S.	H-37	4/6/18
Adams, Frank D.	I-40	5/4/18	Anderson, Louis	M-56	9/14/18
Adams, James D.	H-21	12/1/17	Anderson, Robert	K-72	12/21/18
Adams, Lorimer S.	K-70	12/7/18	Anderson, Robert M.	H-9	9/8/17
Aid, Harry	M-61	10/19/18	Andrews, Bruce B.	M-53	8/24/18
Ainslie, Walter M.	H-38	4/13/18	Andrews, Clifford S.	H-8	9/1/17
Ainsworth, Frank W.	M-45	6/22/18	Andrews, Hartley B.	M-59	10/5/18
Akert, Edward R.	H-37	4/6/18	Andrews, Henry G.	H-6	8/18/17
Albi, Joseph A.	H-36	3/30/18	Andrews, Howard M.	H-28	2/2/18
Albright, John J.	M-60	10/12/18	Andrews, Lloyd J.	H-37	4/6/18
Albright, Oliver	H-36	3/30/18	Aney, Melvin	H-11	9/22/17
Alcorn, Donald E.	M-58	9/28/18	Angier, Corliss	H-18	11/10/17
Aldrich, John B.	M-51	8/3/18	Anspach, Paul P.	H-31	2/23/18
Alford, Carl C.	K-72	12/21/18	Appelhoff, John A.	K-74	1/11/19
Allen, Carlos H.	M-58	9/28/18	Appelton, Francis L.	H-23	12/15/17
Allen, Charles M.	H-27	1/26/18	Appling, Grady S.	M-59	10/5/18
Allen, George B.	H-30	2/16/18	Apte, Benjamin B.	M-51	8/3/18
Allen, George F.	M-56	9/14/18	Archer, Allen T.	H-24	12/22/17
Allen, Paul V.	H-20	11/24/17	Archer, Cecil E.	H-30	2/23/18
Allen, Roy	K-69	11/30/18	Argyle, Horace R.	M-54	8/31/18
Allen, Thomas F.	M-51	8/3/18	Armstrong, Donald H.	H-13	10/6/17
Allin, Roy M.	M-52	8/10/18	Armstrong, John A.	M-65	11/16/18
Allison, Ernest	I-40	5/4/18	Armstrong, Ralph S.	H-25	1/19/18
Allison, Roy G.	H-36	3/30/18	Armstrong, Russell B.	H-31	2/23/18
Almgren, Arvid	M-50	7/27/18	Ash, John L.	L-42	5/25/18
Ames, Charles B. Jr.	H-74	12/14/18	Ashe, Sam	M-44	6/15/18
Ames, Charles H.	M-44	6/15/18	Ashton, Blanchard P.	M-59	10/5/18
Anderson, Arthur H.	M-56	9/14/18	Atkins, George J.	K-69	11/30/18
Anderson, Charles A.	M-46	6/29/18	Atchison, Grant A.	H-40	4/27/18
Anderson, Cecil M.	H-15	10/20/17	Atchison, Thomas E.	K-77	2/1/19

Total to bottom of this sheet - 70

Jerom, David G.	B-34	6/20/38	Orton,		1/20/3
Abernethy, Lonia V.	B-	1/11/39	Carlson, Ida C.	B-	12/20/3
Abloe, William O.	B-2	6/	Anderson, Helge C.	B-	8/ /3
L ,	-24	6/	Peterson, Hans	B-	7/ /3
,	M-01	1/	Peterson, Peter J.	B-35	8/ /3
Adams, Arthur A.	B-	6/	Peterson, Lucas	B-37	6/ /3
Adams, Frank D.	B-	6/	Peterson, Lucia	B-	9/24/3
Adams, James E.	B-21	12/17/38	Peterson, Peter	B-	12/21/3
Adams, Norman P.	B-	12/17/38	Anderson, Peter	B-	8/31/3
Adl ,	B-	6/	Andrews, Bruce	B-	8/ /3
Ailie, Melton K.	B-	6/	Andrews, Clifford J.	B-	9/ /3
Ainsworth, Frank E.	B-	8/22/38	Andrews, Cleo B.	B-	9/ /3
Akt , Edward P.	B-31	6/	Andrews, Henry C.	B-3	8/28/3
Alb , Jose	B-	6/	Andrews, Homer L.	B-	8/ /3
Albright, Jo	B-	10/12/38	Andrews,	B-	8/ /3
Albright, Olin	B-	6/	Andrews, Mol	B-	8/ /3
Alcorn, Donald E.	B-3	6/	Anglin, Paul T.	B-18	12/20/3
Alderich, John B.	B-21	8/5/38	Angus,	B-	8/ /3
Alford, Carl C.	B-	12/	Antell, John A.	B-1	8/ /3
Allen, Carlos M.	B-	9/22/38	Appolton,	B-	12/15/3
Allen, Charles M.	B-	10/	Arndt,	B-	8/ /3
Allen,	B-	6/	Arpke, Benjamin E.	B-	8/ /3
Allen,	B-38	6/	Arsner, Allen T.	B-2	12/22/3
Allen,	B-	12/23/37	Artor, Bert E.	B-	8/20/3
Allen,	B-3	6/	Asplo, Bruce L.	B-2	8/21/3
Allin, Roy M.	B-	8/ /38	Atkinson, Donald K.	B-1	8/ /3
Allison, Ben	B-	6/	Atkinson, John	B-	8/ /3
Allison, Roy G.	B-2	8/4/38	Atmsbrook, Rob	B-	8/ /3
Almgren, Arvid	B-3	7/27/38	Atp, Jo	B-4	8/ /3
Alms , Charles R. Jr.	B-1	12/	Atsko, Ben	B-1	8/ /3
Ames, Charles	B-	12/	Atkinson, George J.	B-	10/ /3
Anderson, Arthur H.	B-	6/	Atkinson,	B-	8/ /3
Anderson, Charles A.	B-	6/	Atkinson,	B-20	8/ /3
Anderson, Cecil M.	B-2	10/20/37	Atkinson, Thomas M.	B-11	8/ /3

Appendix _____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Atkinson, Harold K.	H-26	1/19/18	Ballinger, Glenory	I-41	5/11/18
Atkinson, Ralph S.	M-61	10/19/18	Ballinger, Ray E.	M-47	7/6/18
Attix, Ernest A.	M-59	10/5/18	Banning, George H.	H-24	12/22/17
Austin, William J.	I-41	5/11/18	Banta, George H.	H-37	4/6/18
Austin, Harold C.	M-49	7/20/18	Barber, Leslie R.	M-53	8/24/18
Austin, Hurlbut D.	M-56	9/16/18	Barber, Newell C.	H-20	11/24/17
Auten, Harry W.	H-28	2/2/18	Barden, Paul E.	H-18	11/10/17
Axford, Allan C.	K-76	1/25/19	Barkemeyer, John A.	M-53	8/24/18
Axley, Seth	H-23	12/15/17	Barkley, Robert H.	M-54	8/31/18
Ayers, Milbert P.	H-38	4/13/18	Barnard, Nathan N.	M-56	9/14/18
Baas, Lyle R.	M-49	7/20/18	Barnes, Archie R.	H-74	12/14/18
Bache, D. M.	H-4	8/4/17	Barnes, Edwin A.	H-14	10/13/17
Backus, Charles F. Jr.	H-29	2/9/18	Barnes, Frank A.	K-69	11/30/18
Bacon, Asaph P.	H-38	4/13/18	Barnes, Kenneth G.	H-23	12/15/17
Bacon, Christian O.	H-34	3/16/18	Barnes, Phillip S.	M-46	6/29/18
Bacon, Max E.	H-30	2/16/18	Barnett, Leory M.	M-65	11/16/18
Bader, Eugene F.	H-32	3/2/18	Barnhart, Leroy W.	H-29	2/9/18
Bagby, Howard	I-40	5/4/18	Barr, David W.	H-10	9/15/17
Baggott, Charles	M-54	8/31/18	Barr, James P.	M-57	9/21/18
Bagley, William L.	M-56	9/14/18	Barr, Joseph	M-47	7/6/18
Bailey, Herbert A.	M-54	8/31/18	Barrett, James T.	H-34	3/16/18
Bailey, Lloyd E.	H-14	10/13/17	Barrett, William J.	H-31	2/23/18
Bailey, Louis C.	H-27	1/26/18	Barry, Rutledge B.	H-3	7/28/17
Baird, Earl L.	M-44	6/15/18	Barry, William J.	H-74	12/14/18
Baird, Robert W.	M-49	7/20/18	Bartholomae, William A	H-29	2/9/18
Baird, Walter E.	H-39	4/20/18	Bartlett, F. M.	H-2	7/21/18
Baisley, Herbert K.	H-31	2/23/18	Bartlett, Lowell M.	H-37	4/6/18
Baker, Lea W.	K-76	1/25/19	Baruch, Frederick H.	L-42	5/25/18
Baker, Livingston L.	H-8	9/1/17	Bashor, Horace A.	M-56	9/14/18
Baker, Ronald F.	M-56	9/14/18	Bastow, Joseph G.	H-21	12/1/17
Baker, Samuel C.	H-20	11/24/18	Bates, Byron M.	M-60	10/12/18
Balch, George E.	M-56	9/14/18	Bates, Lesley R.	I-41	5/11/18
Baldwin, Guy N.	M-46	6/29/18	Batz, August F.	M-54	8/31/18
Balis, Arthur	M-56	9/14/18	Batz, John B.	M-44	6/8/18
Ballard, Audrey B.	H-22	12/8/17	Baum, Frank H.	H-29	2/9/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Bayley, Eugene B.	H-11	9/22/17	Bergh, James R.	H-18	11/10/17
Beals, Alvaro N.	M-52a	8/17/18	Berkin, Jay J.	H-35	3/23/18
Beck, Bordon F.	M-53	8/24/18	Berry, R. B.	H-5	8/11/17
Beck, Daniel H.	H-34	3/16/18	Berry Thornton A.	H-31	2/23/18
Beck, George C.	H-27	1/26/18	Bertram, Arthur R.	H-39	4/20/18
Beckett, Ralph E.	K-42	5/18/18	Bettannier, Leo C.	M-48	7/13/18
Beebe, Wallace B.	H-15	10/20/17	Bevier, Raymond K.	M-63	11/2/18
Beecher, Charles E.	M-54	8/31/18	Bidwell, Robinson E.	H-29	2/9/18
Beekley, Archie G.	H-30	2/16/18	Bigelow, C. R.	H-4	8/4/17
Beery, Levi L.	H-30	2/16/18	Bihlman, George H.	M-59	10/5/18
Behncke, David L.	H-19	11/17/17	Biles, Kenneth C.	H-33	3/9/18
Beiseker, Charles E.	H-38	4/13/18	Billard, Phil L.	H-15	10/20/17
Beisel, Harold N.	H-39	4/20/18	Billings, Benjamin F.	M-48	7/13/18
Bell, Alonzo E.	H-28	2/2/18	Birkeland, Harold	H-33	3/9/18
Bell, Charles R.	M-59	10/5/18	Bishop, Willard A.	M-57	9/21/18
Bell, George E.	H-24	12/22/17	Bixler, Ralph B.	M-55	9/7/18
Bell, Kenneth	H-1	7/14/17	Black, Avery J.	H-26	1/19/18
Bell, Lester J.	M-55	9/7/18	Black, Grover C.	H-17	11/3/17
Bell, Merton	M-61	10/19/18	Black, Harold	K-75	1/18/19
Bell, Robert W.	H-32	3/2/18	Blackard, Wade	K-71	12/14/18
Bell, Spencer M.	H-13	10/6/17	Blacknall, Valentine T	M-51	8/3/18
Belsjoe, Thomas	H-3	7/28/17	Blain, John D.	H-32	3/2/18
Belsky, Charles J.	H-31	2/23/18	Blair, James	H-28	2/2/18
Bemis, Lawrence W.	M-67	11/30/18	Blake, Thomas W.	M-58	9/28/18
Benbow, Ceborn A.	M-48	7/13/18	Blake, Walter M.	M-56	9/14/18
Benedict, G. W.	H-2	7/21/17	Blake, Wilfred K.	M-61	10/19/18
Benefiel, Jack W.	M-59	10/5/18	Blanchard, John S.	M-56	9/14/18
Bennett, Ivan E.	M-57	9/21/18	Blanton, Edgar P.	M-42	6/1/18
Bennett, William N.	M-61	10/19/18	Blitman, Charles H.	I-40	5/4/18
Benson, Harry E.	M-60	10/12/18	Blodgett, Clifford A.	M-55	9/7/18
Benton, Jack E.	K-77	2/1/19	Bloom, Edward L.	H-24	12/22/17
Benton, James T.	M-43	6/8/18	Bloom, Samuel S.	M-51	8/3/18
Benton, John W.	H-34	3/16/18	Blote, Harold C.	M-64	11/9/18
Bentley, Frank H.	H-18	11/10/17	Blount, George W.	M-45	6/22/18
Berg, Carl L.	H-19	11/17/17	Blowers, Hughes M.	M-56	9/14/18

Total to bottom of this sheet - 210

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], Eugene A.	[illegible]	[illegible], Edmund K.	[illegible]	[illegible]
[illegible], Alvaro M.	[illegible]	Denfeld, Guy D.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	Derry, R. H.	[illegible]	[illegible]
[illegible], Daniel H.	[illegible]	Dorr-Tom A.	[illegible]	[illegible]
[illegible], George G.	[illegible]	Dorton, Arthur R.	[illegible]	[illegible]
Beckett, Ralph E.	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
Beebe, Wallace B.	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
[illegible], Charles E.	[illegible]	Bidwell, Robinson L.	[illegible]	[illegible]
[illegible], Archie G.	[illegible]	[illegible], C. G.	[illegible]	[illegible]
Beery, [illegible]	[illegible]	Billman, George K.	[illegible]	[illegible]
[illegible], David R.	[illegible]	Bilse, Herman C.	[illegible]	[illegible]
Blacker, Chas. [illegible]	[illegible]	Blake, Phil B.	[illegible]	[illegible]
Bobel, Harold M.	[illegible]	[illegible], Borghardt E.	[illegible]	[illegible]
[illegible], Alvaro E.	[illegible]	Bolen, [illegible]	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	Bonfer, Ralph A.	[illegible]	[illegible]
Bell, Kenneth	[illegible]	[illegible], Harry C.	[illegible]	[illegible]
[illegible], Loaker G.	[illegible]	[illegible], Grover G.	[illegible]	[illegible]
Bill, Merton	[illegible]	Brook, Harold	[illegible]	[illegible]
[illegible], Hoover E.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], Spencer [illegible]	[illegible]	[illegible], John D.	[illegible]	[illegible]
Daly, Chester G.	[illegible]	Blair, Omar	[illegible]	[illegible]
Davis, Lawrence E.	[illegible]	[illegible], Clarence C.	[illegible]	[illegible]
[illegible], Osborn R.	[illegible]	Lake, Walter K.	[illegible]	[illegible]
[illegible], G. W.	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
[illegible], Jack [illegible]	[illegible]	[illegible], Geo. E.	[illegible]	[illegible]
[illegible], Ivan E.	[illegible]	[illegible], Ed [illegible]	[illegible]	[illegible]
[illegible], William M.	[illegible]	[illegible], Charles E.	[illegible]	[illegible]
[illegible], Harry P.	[illegible]	[illegible], Clifton [illegible]	[illegible]	[illegible]
Denton, Jack [illegible]	[illegible]	[illegible], Edward L.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	Jones, Samuel S.	[illegible]	[illegible]
[illegible], John C.	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
[illegible], Frank E.	[illegible]	[illegible], George M.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible], [illegible]	[illegible]	[illegible]

Appendix _____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Blurton, Melvin R.	H-18	11/10/17	Bowker, Harry B.	H-40	4/27/18
Bodwell, Rea E.	H-37	4/6/18	Bowles, Robert H.	H-11	9/22/17
Bogel, Galitzen N.	H-28	2/2/18	Bowman, Charles L.	M-54	8/31/18
Boggs, M. S.	H-9	9/8/17	Bowman, Logan M.	M-54	8/31/18
Boggs, Stanhope S.	H-28	2/2/18	Bowman, Raymond F.	M-55	9/7/18
Bohrman, Carl T.	M-62	10/26/18	Boxell, Earl F.	H-33	3/9/18
Bolles, Julius H.	M-57	9/21/18	Boyd, George W.	H-34	3/16/18
Bolsinger, Ray C.	H-39	4/20/18	Boyd, Harold E.	M-54	8/31/18
Bolton, John Hugh	H-26	1/19/18	Boyd, Thomas H.	M-59	10/5/18
Boner, Earl W.	M-56	9/14/18	Boyden, George W.	M-58	9/28/18
Bonesteel, Kenneth	H-32	3/2/18	Boyer, James P.	L-68	11/30/18
Bonnalie, Allen F.	H-3	7/28/17	Boyles, John L.	M-54	8/31/18
Bonnett, Edward M.	H-40	4/27/18	Braak, Gail Van den	H-25	1/12/18
Bonneville, William H.	H-36	3/30/18	Brace, Harry D.	M-52	8/10/18
Boone, Franklin D.	M-44	6/15/18	Bradbury, George E.	M-55	9/7/18
Boone, Ralph R.	H-33	3/9/18	Braddick, Cecil H.	H-11	9/22/17
Booth, A. B.	H-6	8/18/17	Bradford, Holt W.	H-12	9/29/17
Boothe, Isaac J.	M-50	7/27/18	Braley, Wayne M.	M-56	9/14/18
Bornecamp, Frederick F	M-55	9/7/18	Bramhall, M.	H-7	8/25/17
Borton, Albert J.	M-58	9/28/18	Brammer, George A.	H-23	12/15/17
Bosler, Barrett K.	H-28	2/2/18	Brand, Harold	M-44	6/15/18
Bosqui, Edward W.	H-17	11/3/17	Brandt, Paul L.	K-74	1/11/19
Bostick, Jaen V.	L-68	11/30/18	Brannum, Claude J.	H-34	3/16/18
Bostwick, Wayne L.	K-70	12/7/18	Brayton, Howard C.	H-40	4/27/18
Bottenfield, Wilfred B.	M-46	6/29/18	Brazil, Valdevino H.	I-40	5/4/18
Boudreaux, Ray H.	M-59	10/5/18	Breckon, Leslie S.	H-33	3/9/18
Boulware, George L.	H-23	12/15/17	Breese, Winfield S.	H-28	2/2/18
Bourman, Charles A.	H-39	4/20/18	Brelin, Ebbe A.	M-54	8/31/18
Bowden, Jerome T.	L-68	11/30/18	Brelin, Hilding G.	M-49	7/20/18
Bowen, Clark G.	H-30	2/16/18	Bremer, Carl A.	H-39	4/20/18
Bowen, William E.	M-45	6/22/18	Bremmer, Carl St. J.	M-50	7/27/18
Bower, Byron F.	H-30	2/16/18	Breneman, Lauren E.	M-64	11/9/18
Bowers, Ernest E.	M-54	8/31/18	Brenker, Arch H.	M-55	9/7/18
Bowhay, Leonard D.	M-53	8/24/18	Brewer, Percy O.	H-34	3/16/18
Bowker, Frank B.	M-54	8/31/18	Brichta, Louis C.	H-8	9/1/17

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Bridges, Kenneth L.	H-30	2/16/18	Bryce, Ellsworth	M-55	9/7/18
Brierley, George C.	H-40	4/27/18	Buck, Carl E.	H-36	3/30/18
Briggs, M. L.	H-9	9/8/17	Buck, Samuel R.	M-49	7/20/18
Briggs, William C.	M-67	11/30/18	Buckley, Cecil W.	H-28	2/2/18
Brigham, Frank O.	H-17	11/3/17	Buckley, Francis J.	H-7	8/25/17
Brink, Rodney L.	M-55	9/7/18	Buckley, Henry W.	M-59	10/5/18
Brinker, Tom J.	H-39	4/20/18	Buckley, Raymond J.	H-31	2/23/18
Briscoe, James J.	K-69	11/30/18	Buckner, Charles G.	H-14	10/13/17
Brock, Harry	H-28	2/2/18	Buckner, Harold E.	M-56	9/14/18
Brodersen, Leroy	H-24	12/22/17	Buckner, Samuel G.	M-49	7/20/18
Brokmeyer, Albert F.	H-27	1/26/18	Buell, William C.	M-44	6/15/18
Brooks, F. H.	H-5	8/11/17	Buetell, Paul E.	M-51	8/3/18
Broomfield, Hugh D.	H-12	9/29/17	Bulford, George E.	M-67	11/30/18
Brosnan, H. M.	H-7	8/25/17	Pulkley, Paul G.	H-40	4/27/18
Brown, Addison	H-8	9/1/17	Bullen, Hal H.	M-52	8/10/18
Brown, Albert S.	H-35	3/23/18	Bunger, William M.	M-52a	8/17/18
Brown, David K.	H-30	2/16/18	Bunker, Harry L.	M-53	8/24/18
Brown, Delano A.	M-56	9/14/18	Burbeck, William D.	M-46	6/29/18
Brown, Edward A.	M-53	8/24/18	Burger, Charles N.	K-42	5/18/18
Brown, Elon L.	M-44	6/15/18	Burgess, Robert L.	H-32	3/2/18
Brown, Fred H.	M-58	9/28/18	Burgess, Walter K.	I-40	5/4/18
Brown, Harry S.	M-59	10/5/18	Burkett, Harold P.	K-70	12/7/18
Brown, Mays P.	H-28	2/2/18	Burkholder, John C.	M-47	7/6/18
Brown, Rolla	H-31	2/23/18	Burks, Charles R.	M-67	11/30/18
Brown, Sewall	H-28	2/2/18	Burnett, Jay O.	M-56	9/14/18
Brown, Walter L.	K-71	12/14/18	Burnett, William A.	M-56	9/14/18
Brown, Wilbur T.	H-20	11/24/17	Burnight, E. R.	H-9	9/8/17
Browne, Charles E.	H-26	1/19/18	Burns, Elmer J.	K-75	1/18/19
Brownlee, Fred P.	H-26	1/19/18	Burns, John L.	H-30	2/16/18
Brubaker, Charles E.	M-56	9/14/18	Burns, John R.	H-11	9/22/17
Bruce, W. R.	H-9	9/8/17	Burns, John V.	H-29	2/9/18
Bruner, George W.	K-70	12/7/18	Burns, Leroy	H-31	2/23/18
Brunner, Charles F.	H-33	3/9/18	Burns, Marion L.	M-43	6/8/18
Brunson, Clair Benton	I-40	5/4/18	Burns, Wilbur J.	M-57	9/21/18
Bryan, William J.	M-56	9/14/18	Burr, Richard O.	H-24	12/22/17

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Burris, Paul F.	M-52a	8/17/18	Canty, Timothy J.	H-37	4/6/18
Burruss, George H.	H-40	4/27/18	Carbee, Gwin W.	M-60	10/12/18
Burton, J. F.	H-9	9/8/17	Cardiff, Donald L.	M-59	10/5/18
Buser, Albert E.	H-32	3/2/18	Cardoff, Earl F.	H-31	2/23/18
Bush, Donald R.	K-77	2/1/19	Carey, Walter R.	M-43	6/8/18
Bush, Franklin H.	K-76	1/25/19	Carlberg, Edward F.	H-29	2/9/18
Bushman, Francis L.	H-28	2/2/18	Carleton, George L.	H-28	2/2/18
Bushman, Ralph J.	H-29	2/9/18	Carlson, Lester A.	K-70	12/7/18
Busk, Stephen L.	H-39	4/20/18	Carlson, Thomas M.	I-40	5/4/18
Buster, Melvin W.	H-28	2/2/18	Carmichael, Georga A.	M-46	6/29/18
Butler, Roy J.	H-27	1/26/18	Carmody, Frank J.	M-61	10/19/18
Buttner, Edgar I.	K-77	2/1/19	Carpell, Otto G.	M-31	2/23/18
Button, Frank P.	M-56	9/14/18	Carpenter, Frank C.	M-61	10/19/18
Button, Malcolm P.	K-75	1/18/19	Carr, Edward E.	M-50	7/27/18
Butts, Daniel E.	H-32	3/2/18	Carr, Richard M.	H-40	4/27/18
Byrnes, Walter A.	H-36	3/30/18	Carrington, Paul	K-42	5/18/18
Byron, Edward W.	L-68	11/30/18	Carroll, James B.	H-13	10/6/17
Cahoon, Brent F.	M-57	9/21/18	Carroon, William E.	H-10	9/15/17
Caldwell, Jabin B.	H-22	12/8/17	Carruthers, Albert S.	M-51	8/3/18
Caldwell, John R.	M-58	9/28/18	Carson, Alvin H.	M-53	8/24/18
Callahan, Samuel M.	H-30	2/16/18	Carter, Armistead	M-58	9/28/18
Calvert, Lawrence C.	M-61	10/19/18	Carter, Edward V.	H-34	3/16/18
Campbell, Dudley R.	H-30	2/16/18	Carter, Francis M.	M-59	10/5/18
Campbell, George L.	H-40	4/27/18	Carter, Harry W.	H-30	2/16/18
Campbell, Hansom M.	K-70	12/7/18	Carter, William R.	M-49	7/20/18
Campbell, Harry D.	M-59	10/5/18	Cary, E. A.	H-7	8/25/17
Campbell, Leland	M-60	10/12/18	Cary, Malcolm C.	H-31	2/23/18
Campbell, Roscoe W.	M-50	7/27/18	Case, Floyd W.	K-77	2/1/19
Camper, Ernest B.	M-47	7/6/18	Casey, Joseph D.	H-40	4/27/18
Canby, Alfred J.	H-26	1/19/18	Cash, Lytell George	L-68	11/30/18
Canney, Walter H.	L-68	11/30/18	Castendyck, Charles H.	K-75	1/18/19
Cannon, Charles H.	H-27	1/26/18	Cate, Fred H.	M-67	11/30/18
Cannon, John A.	H-3	7/28/17	Cauthen, James C.	H-29	2/9/18
Cannon, Robert H.	H-30	2/16/18	Cavagnaro, James F.	H-26	1/19/18
Cannon, Walter D.	H-33	3/9/18	Chaddock, Homer L.	H-29	2/9/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Chaffee, Herbert N.	H-33	3/9/18	Clampett, Frederick W.	H-23	12/15/17
Chamberlain, ClarenceW.	M-54	8/31/18	Clampett, Robert D.	L-42	5/25/18
Chamberlin, Clarence A.	K-70	12/7/18	Clancy, John F.	H-36	3/30/18
Chamberlin, W.	H-5	8/11/17	Clapp, William D.	H-33	3/9/18
Chamberlin, William	M-55	9/7/18	Clark, Arthur F.	H-34	3/16/18
Chambers, Howard E.	M-43	6/8/18	Clark, Charley F.	M-58	9/28/18
Chandler, Charles M.	M-52	8/10/18	Clark, Chester B.	H-31	2/23/18
Chandler, Clyde E.	L-42	5/25/18	Clark, Elmer C.	H-40	4/27/18
Chandler, Homer B.	H-18	11/10/17	Clark, Hobart	H-30	2/16/18
Chaplin, Claude M.	H-13	10/6/17	Clark, J. H.	H-9	9/8/17
Chapman, Allen	H-23	12/15/17	Clark, Milo W.	M-45	6/22/18
Chapman, Alvin L.	M-44	6/15/18	Clark, Ray H.	H-40	4/27/18
Chapman, Fred D.	M-52	8/10/18	Clark, Samuel G.	H-40	4/27/18
Chapman, Harold C.	H-25	1/12/18	Clark, Smith D.	H-19	11/17/17
Chapman, Harold O.	M-49	7/20/18	Clark, Stuart K.	H-40	4/27/18
Charles, William O.	M-61	10/19/18	Clark, Victor M.	M-55	9/7/18
Charlton, Duncan E.	M-58	9/28/18	Clark, William B.	H-40	4/27/18
Charrion, Arthur P.	H-29	2/9/18	Clark, William D.	M-45	6/22/18
Chase, Cecil A.	H-38	4/13/18	Clarkson, Fuller	M-47	7/6/18
Chase, Paul W.	H-23	12/15/17	Clayton, J. M.	H-4	8/4/17
Chatterson, M. Cragg	H-28	2/2/18	Cleary, Leslie A.	M-21	12/1/17
Chenoweth, Clyde G.	M-46	6/29/18	Cleary, M. J.	H-2	7/21/17
Chesley, Carlton C.	M-66	11/23/18	Clemens, Jere J.	M-43	6/8/18
Childers, Harry S.	L-68	11/30/18	Clement, Alfred Jr.	M-53	8/24/18
Chiles, Chester A.	H-38	4/13/18	Clevenger, Cloyd P.	M-57	9/21/18
Christensen, Roy E.	M-56	9/14/18	Cliff, Nelson A.	H-20	11/24/17
Christie, Donald C.	H-29	2/9/18	Close, Myron	H-11	9/22/17
Christopher, Vern E.	M-52a	8/17/18	Clute, Walter S.	K-76	1/25/19
Christopherson, Fred C.	H-38	4/13/18	Coates, William T.	H-30	2/16/18
Christy, William G.	M-43	6/8/18	Cobb, Cecil E.	M-50	7/27/18
Church, Carl A.	M-56	9/14/18	Cobb, James F. Jr.	H-27	4/6/18
Citron, Alvin E.	H-37	4/6/18	Cobb, Lawrence C.	I-41	5/11/18
Claar, Stewart B.	H-25	1/12/18	Cobb, Vaughan M.	H-31	2/23/18
Claghorn, J. L.	H-7	8/25/18	Cobel, Ivan L.	M-45	6/22/18
Claiborne, Harry C.	I-40	5/4/18	Cochran, John R.	M-46	6/29/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Cochrane, Robert M.	I-40	5/4/18	Conrad, James L.	M-64	11/9/18
Cochrane, William R.	H-35	3/23/18	Conrad, Max H.	M-30	2/16/18
Codington, Arthur D.	H-29	2/9/18	Conroy, Thomas P.	M-19	11/17/17
Coe, Bernard	H-33	3/9/18	Cook, Dean C.	H-38	4/13/18
Coffee, Harold L.	H-38	4/13/18	Cook, L. E.	M-1	7/14/17
Coffing, Lawrence D.	M-24	12/22/17	Cook, Ralph D.	M-26	1/19/18
Coffman, Wesley R.	M-59	10/5/18	Cook, Ray C.	H-29	2/9/18
Cohen, Douglas E.	M-66	11/23/18	Cook, Ray M.	K-72	12/21/18
Coke, Sterling D.	M-59	10/5/18	Cook, Scott L.	M-52	8/10/18
Cole, Harold L.	H-35	3/23/18	Cook, William L. S.	H-30	2/16/18
Cole, Harry L.	M-55	9/7/18	Cooley, Charles E.	M-61	10/19/18
Cole, Lloyd L.	M-64	11/9/18	Coombs, Cyril L.	M-31	2/23/18
Colburn, Elsworth R.	M-45	6/22/18	Coop, Alfred M.	H-30	2/16/18
Coleman, Richard R. Jr.	H-11	9/22/17	Cooper, C. W.	M-5	8/11/17
Coles, Norman E.	H-35	3/23/18	Cooper, Francis J.	H-28	2/2/18
Collins, James V.	M-56	9/14/18	Cooper, Henry B.	M-53	8/24/18
Collins, Robert B.	M-44	6/15/18	Copeland, William H.	M-46	6/29/18
Collins, Wallace C.	M-51	8/3/18	Copeland, Raymond C.	M-57	9/21/18
Colt, Frank	K-71	12/14/18	Coray, Claude L.	M-44	6/15/18
Colton, Earl G.	H-30	2/16/18	Corbitt, Marsh M.	H-33	3/9/18
Compere, Harold	H-24	12/22/17	Cordiner, Neil E.	M-57	9/21/18
Compton, Earl V.	H-38	4/13/18	Cordner, J. Herold	M-61	8/3/18
Compton, Robert D.	M-63	11/2/18	Corkille, John D.	I-40	5/4/18
Conant, Guy R.	M-57	9/21/18	Corbett, James W.	M-58	9/28/18
Conant, Laurence F.	H-29	2/9/18	Corrick, Everett W.	H-39	4/20/18
Cone, Paul M.	M-57	9/21/18	Corsuat, Jesse H.	H-29	2/9/18
Confarr, Gene S.	M-55	9/7/18	Cosper, Lloyd C.	M-17	11/3/17
Conklin, Ronald	H-38	4/13/18	Costar, Lloyd	H-34	3/16/18
Conlon, James M.	M-43	6/8/18	Cotton, Horace G.	H-39	4/20/18
Connelly, Robert M.	H-36	3/30/18	Cotton, John B.	H-23	3/16/18
Conner, Charles C.	M-55	9/7/18	Cottrell, Clinton C.	H-23	12/15/17
Connelly, Cecil H.	H-23	12/15/17	Couch, Howard H.	I-40	5/4/18
Connor, Vivian S.	M-51	8/3/18	Cover, Carl A.	H-28	2/2/18
Conrad, Clarence W.	M-47	7/6/18	Cowdery, William H.	M-57	9/21/18
Conrad, Glenn V.	H-40	4/27/18	Cowgill, Lester J.	H-8	9/1/17

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Cowin, Alden L.	H-30	2/16/18	Curran, F. S.	H-20	11/24/17
Cox, John D.,Fr.	H-23	12/15/17	Currie, John A.	M-59	10/5/18
Cox, Lester Edmund	H-36	3/30/18	Curtis, Carl E.	M-61	10/19/18
Cox, Oliver W.	M-53	8/24/17	Curtis, Nathaniel	M-61	10/19/18
Coyne, George P.	M-54	8/31/18	Curtiss, Dwight W.	I-40	5/4/18
Cozier, Paul M.	H-39	4/20/18	Curtiss, Erland L.	H-39	4/20/18
Crabtree, Lloyd W.	I-40	5/4/18	Cutrell, Ernest A.	M-51	8/3/18
Cragg, Wilbur W.	M-46	6/29/18	Dahlem, Earl C.	H-29	2/9/18
Craig, Donald J.	K-72	12/21/18	Dailey, Gardner A.	H-23	12/15/17
Crandall, Bert H.	L-68	11/30/18	Dale, Lloyd B.	M-57	9/21/18
Crandall, William J.	M-61	10/19/18	Dallas, Burnie R.	H-27	1/26/18
Crane, Oliver P. H.	H-22	12/8/17	Daly, Jesse L.	M-60	10/12/18
Crawford, Otis B.	L-42	5/25/18	Daly, Richard E.	M-51	8/3/18
Crawford, Reed F. H-32	H-32	3/2/18	Dana, Earl A.	M-56	9/14/18
Crawford, William R.Jr.	K-77	2/1/19	Dana, Leslie V.	H-25	1/19/18
Creighton, Orme A.	M-58	9/28/18	Daniel, Roy P.	H-32	3/2/18
Crippen, Hawley O.	M-59	10/5/18	Daniels, Albert J.	H-31	2/23/18
Crippen, Roy D.	M-58	9/28/18	Daniels, D. P.	H-5	8/11/17
Crocker, Clarke W.	H-39	4/20/18	Dannenberg, Richard M.	M-65	11/16/18
Crocker, Harrison G.	H-37	4/6/18	Dark, Carleton W.	M-42	6/1/18
Crossan, Carroll B.	H-28	2/2/18	Daub, Wade G.	H-28	2/2/18
Crouch, Lloyd H.	H-38	4/13/18	Daube, J. F. O.	H-1	7/14/17
Crowell, Harold R.	H-8	9/1/17	Davey, James J.	H-21	12/1/17
Croxson, Albert M.	H-34	3/16/18	Davidson, Carlton F.	H-28	2/2/18
Crozier, Raymond L.	M-44	6/15/18	Davidson, Fay L.	M-57	9/21/18
Crum, Gay	H-16	10/27/17	Davidson, Frank G.	H-10	9/15/17
Cullity, Emmet R.	H-40	4/27/18	Davidson, G. C.	H-4	8/4/17
Cumberpatch, James T.	M-45	6/22/18	Davidson, Warren C.	M-51	8/3/18
Cummings, Charles M.	H-34	3/16/18	Davies, Frederick C.	M-56	9/14/18
Cummings, Jack	M-43	6/8/18	Davies, John A.	M-67	11/30/18
Cummings, Louis D.	M-55	9/7/18	Daviess, Marion L.	M-44	6/15/18
Cunningham, James R.	M-47	7/6/18	Davis, Alex W.	M-58	9/28/18
Cunningham, Samuel D.	H-34	3/16/18	Davis, Don D.	K-72	12/21/18
Cunningham, Ulmer M.	M-57	9/21/18	Davis, Earl A.	H-30	2/16/18
Cupples, William H.	H-17	11/3/17	Davis, Elmer C.	K-42	5/18/18

Total to bottom of this sheet - 630

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Davis, Charles B.	M-54	8/31/18	Denham, Chester D.	M-66	11/23/18
Davis, Earl D.	H-15	10/20/17	Denhart, Harry J.	M-52	8/10/18
Davis, George A.	M-48	7/13/18	Denman, Cedric E.	M-52a	8/17/18
Davis, George E.	H-39	4/20/18	Despain, Lawrence N.	H-29	2/9/18
Davis, Harry B.	K-72	12/21/18	Dessieux, Edwin G.	K-72	12/21/18
Davis, Harry B. Jr.	H-20	4/27/18	Detchen, Orra I.	M-56	9/14/18
Davis, Henry G.	M-65	11/16/18	Detels, Martin P.	M-65	11/16/18
Davis, John C.	H-39	4/20/18	Detlefsen, Gustav C.	H-38	4/13/18
Davis, John P.	M-56	9/14/18	Detrick, Arnold B.	M-57	9/21/18
Davis, K. M.	H-22	12/8/17	Dewald, William N.	H-14	10/13/17
Davis, Maurice H.	M-56	9/14/18	Diavila, Louis B.	H-29	2/9/18
Davis, Paul A.	H-38	4/13/18	Dibble, Leland C.	M-47	7/6/18
Davis, Paul O.	H-16	10/27/17	Dickson, Carl G.	M-58	9/28/19
Davis, Reed E.	M-56	9/14/18	Dickson, David C.	H-23	12/15/17
Davis, William B.	M-49	7/20/18	Dickason, James F.	H-24	12/22/17
Davis, Willis E.	H-14	10/13/17	Diehl, Norval E.	H-37	4/6/18
Davis, Williston N.	H-13	10/6/17	Diess, Erving G.	H-17	11/3/17
Davis, W. R.	H-7	8/25/17	Dietrick, Glenn I.	K-69	11/30/18
Davy, Leland W.	M-51	8/3/18	Dietrick, Richard H.	H-23	12/15/17
Dawson, Charles B.	H-25	1/12/18	Dievendorff, Horton H.	H-33	3/9/18
Day, Frank F.	M-44	6/15/18	Diggle, Burnham W.	M-43	6/8/18
Day, Robert G.	H-29	2/9/18	Dillin, Forrest H.	H-23	12/15/17
Dayton, Frank E.	H-23	12/15/17	Dimmick, Graham B.	H-74	12/14/18
Dean, Floyd M.	M-49	7/20/18	Dixon, Victor H.	M-54	8/31/18
de Arce, L. P.	H-8	9/1/17	Doane, Basil B.	M-42	6/1/18
DeBolt, Victor H.	M-42	6/1/18	Doane, John H.	H-35	3/23/18
DeCamp, Merritt J.	H-38	4/13/18	Dodd, Hiram E.	H-24	12/22/17
Decker, Kenneth	H-10	9/15/17	Dodds, Harry	H-29	2/9/18
Decker, Perl A.	M-44	6/15/18	Dodge, Harold W.	I-41	5/11/18
Dedrick, Russell F.	M-49	7/20/18	Dodge, Henry W.	H-28	2/2/18
deFremery, L.	H-7	8/25/17	Donaldson, Horace M.	M-59	10/5/18
Degen, Albert G.	M-44	6/15/18	Donnels, Horace C.	M-54	8/31/18
DeLange, Rodney L.	M-53	8/24/18	Doolin, Bernard M.	H-20	11/24/17
Delano, Herman S.	H-31	2/23/18	Doolittle, James H.	H-26	1/19/18
Denbo, George W.	H-30	2/16/18	Dorman, Arkley M.	M-57	9/21/18

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Alabama - School of Military Aeronautics - Maxwell.

Name	Rank	Serial No.	Date	Remarks
[illegible], Charles H.	M-Sgt.	[illegible]	[illegible]	[illegible]
[illegible], Earl D.	T-Sgt.	[illegible]	[illegible]	[illegible]
[illegible], George A.	T/Sgt.	[illegible]	[illegible]	[illegible]
[illegible], George W.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], Harry P.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], Jack O.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], R. E.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], Charles M.	M-Sgt.	[illegible]	[illegible]	[illegible]
[illegible], Fred E.	T-Sgt.	[illegible]	[illegible]	[illegible]
[illegible], Reed E.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], Willis E.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], Williamson K.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible], Clarence [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible],

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Dorrance, George W.	H-27	1/26/18	Earl, G. C. Jr.	H-1	7/14/17
Dorton, Virgil J.	M-57	9/21/18	Earl, Paul J.	M-52	8/10/18
Doty, David E.	H-28	2/2/18	Earley, George E.	H-30	2/16/18
Douglas, Charles	H-16	10/27/18	Eaton, Claude S.	M-48	7/13/18
Douglas, James M.	I-40	5/4/18	Eaton, Joseph E.	H-15	10/20/17
Dow, William A.	M-44	6/15/18	Eaton, St. J. L.	H-6	8/18/17
Dowling, Chester E.	M-51	8/3/18	Ebner, Gerald L.	H-22	12/8/17
Doyle, James A.	M-44	6/15/18	Ebright, Carroll M.	H-33	3/9/18
Drager, Sydney M.	M-52	8/10/18	Eckert, H. R.	H-8	9/1/17
Drake, Charles J.	H-30	2/16/18	Eckmann, Anscel C.	M-48	7/13/18
Driscoll, Thomas P.	M-57	9/21/18	Edgar, H. H.	H-9	9/8/17
Duba, Ralph L.	H-20	4/27/18	Edmund, Harvey W.	H-30	2/16/18
Dudley, Frank B.	H-8	9/1/17	Edmunds, Carl R.	M-57	9/21/18
Dudley, Lloyd M.	H-21	12/1/17	Edwards, Carl W.	H-24	12/22/17
Duff, James G.	K-72	12/21/18	Edwards, F. E.	H-4	8/4/17
Duffy, Melvin B.	M-57	9/21/18	Edwards, Neville G.	M-57	9/21/18
Dulin, Garrettson	H-36	3/30/18	Egan, Thomas M.	H-29	2/9/18
Duncan, Ralph R.	M-53	8/24/18	Eggart, Francis W.	M-60	10/12/18
Duncan, Stanley W.	L-68	11/30/18	Eggleston, William S.	M-59	10/5/18
Dundore, Charles H.	M-45	6/22/18	Ehrlichman, Ben B.	H-32	3/2/18
Dunford, Samuel W.	H-39	4/20/18	Ehrlichman, Rudolph I.	H-40	4/27/18
Dunlap, Hugh A.	M-57	9/21/18	Eielsen, Carl B.	M-55	9/7/18
Dunlap, John	M-58	9/28/18	Eilert, Alvin H.	K-71	12/14/18
Dunn, Thomas F.	H-19	11/17/17	Ekdahl, Frank C.	M-66	11/23/18
Dunn, William L.	M-57	9/21/18	Eldredge, James S.	M-45	6/22/18
Dunnegan, Howard M.	K-77	2/1/19	Eldridge, J. A.	H-6	8/18/17
Dunstan, Fred L.	I-40	5/4/18	Eliel, Leon T.	H-49	7/20/18
DuPuy, Fred K.	L-42	5/25/18	Elkema, Emil C.	H-38	4/13/18
Dupuy, Harry H.	M-44	6/15/18	Ellicott, CharlesG.	M-48	7/13/18
Durham, Henry J.	K-74	1/11/19	Elliott, Daniel W.	H-40	4/27/18
Durham, Lee L. M.	M-60	10/12/18	Elliott, J. J.	H-9	9/8/17
Durst, Willis H.	M-61	10/19/18	Elliott, Marion L.	H-25	1/19/18
Duthie, Roscoe G.	M-65	11/16/18	Elliott, Merle A.	M-39	4/20/18
Dyche, Juston K.	H-26	1/19/18	Elliott, Paul D.	M-53	8/24/18
Eager, Wesley L.	M-58	9/28/18	Elliott, R. P.	H-2	7/21/17

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Borreme, George W.				
, Virgil J.				
, Doris E.				
Courlas, James K.				
, William A.				
Doyle, James A.				
Dreyer, Sydney M.				
Driscoll, Thomas P.				
Duffy, Lloyd M.				
Duffy, Dolvin H.				
, Charles H.				
, Samuel W.				
Dunn, William				
Dunnegan, Howard E.				
, Henry J.				
Burnham, Lee L. M.				
, Cosmo G.				
, Wesley P.				

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating	Name	Sqdn.No.	Graduating
Elliott, William W.	M-56	9/14/18	Evans, Thomas R.	H-8	9/1/17
Ellis, D. E.	H-2	7/21/17	Everett, Aylett L.	H-33	3/9/18
Ellis, Lyman	H-1	7/14/17	Ewall, Hebert B.	M-54	8/31/18
Elsey, George W.	M-29	2/9/18	Eyman, Bradford,	H-25	1/19/18
Elsmore, Raymond T.	H-40	4/27/18	Fabling, Harry C.	H-35	3/23/18
Elston, Welcome B.	H-31	2/23/18	Fairchild, Arthur	H-16	10/27/17
Emerson, George	M-44	6/15/18	Fairchild, Mahlon A.	M-61	10/19/18
Emery, Albert M.	H-40	4/27/18	Fairchild, M. S.	H-2	7/21/17
Emery, George B.	M-57	9/21/18	Fagg, Fred D.	H-24	12/22/17
Engblom, Oscar H.	H-29	2/9/18	Fancher, John T.	H-20	11/24/17
English, Charles W.	K-77	2/1/19	Farran, Dean	M-49	7/20/18
English, Norman A.	M-46	6/29/18	Farmer, William I.	M-52	8/10/18
Engstrom, Theodore A.	H-39	4/20/18	Farquhar, Raymond R.	M-44	6/15/18
Enlow, Charles R.	H-30	2/16/18	Farrar, Robert P.	I-40	5/4/18
Epstein, Walter J.	H-22	12/8/17	Farrell, John B.	H-34	3/16/18
Erich, Ezra E.	M-61	10/19/18	Farris, Homer V.	H-32	3/2/18
Erickson, Fridtjof C.	H-34	3/16/18	Faust, Thomas C.	H-27	1/26/18
Erickson, Harold	H-35	3/23/18	Farwell, Ivyn I.	H-40	4/27/18
Erlendson, Pjetur **	H-31	2/23/18	Feddersohn, Peter L.	M-56	9/14/18
Erickson, Wilbur G.**	M-55	9/7/18	Fehlman, Leo G.	H-37	4/6/18
Essig, Fred M. Jr.	H-39	4/20/18	Feltham, Owen M.	M-60	10/12/18
Estep, Albert R.	L-68	11/30/18	Feltz, Buell J.	M-61	10/19/18
Estes, Herbert J.	H-12	9/29/17	Fennell, James E.	M-46	6/29/18
Eubanks, Clarence M.	M-60	10/12/18	Fennelly, John F.	M-67	11/30/18
Euler, Charles M.	M-57	9/21/18	Ferguson, Carlisle	M-52a	8/17/18
Evans, Chris C.	K-42	5/18/18	Ferguson, Earl	M-62	10/26/18
Evans, Daniel L.	M-55	8/7/18	Ferguson, John A.	I-40	5/4/18
Evans, Emerson B.	M-54	8/31/18	Ferguson, William G.	M-48	7/13/18
Evans, Evan C. Jr.	I-40	5/4/18	Ferguson, William W.	H-23	12/15/17
Evans, Harry D.	M-64	11/9/18	Fern, Charles J.	M-44	6/15/18
Evans, Norman C.	M-57	9/21/18	Fernhoff, Fred B.	H-28	2/2/18
Evans, Oliphant S.	M-61	10/19/18	Ferriter, James C.	K-69	11/30/18
Evans, Ralph R.	M-51	8/3/18	Fetters, Jay M.	M-43	6/8/18
Evans, Richard J.	M-58	9/28/18	Ficke, Charles H.	M-58	9/28/18
Evans, Thomas P. Jr.	H-12	9/29/17	Fielder, Harold E.	M-55	9/7/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Fielding, Anthony M.	M-57	9/21/18	Forbes, George T.	M-51	8/3/18
Fillmore, William H.	H-19	11/17/17	Forbes, Joseph L.	M-61	10/19/18
Filson, Harry R.	H-35	3/23/18	Ford, Edsal P.	M-61	10/19/18
Findley, Joseph L.	M-59	10/5/18	Forrest, Robert P.	H-31	2/23/18
Fink, Frank G.	M-51	8/3/18	Forrest, Spencer E.	H-38	4/13/18
Finley, Malcolm B.	M-53	8/24/18	Foster, Benjamin	H-39	4/20/18
Finnegan, Thomas J.	M-44	6/15/18	Foster, Ellery H.	H-25	1/12/18
Fischer, Frederick	M-56	9/14/18	Foster, Lindsay B.	H-29	2/9/18
Fish, Farnum T.	K-42	5/18/18	Foster, Raymond W.	I-40	5/4/18
Fish, G. W.	H-9	9/8/17	Foster, Robert M.	M-60	10/12/18
Fisher, A. L.	H-7	8/25/17	Foster, Van B.	M-44	6/15/18
Fisher, Henry Jr.	K-77	2/1/19	Fox, Rueben M.	M-56	9/14/18
Fiske, Joseph H.	M-57	9/21/18	Fowler, Lester A.	H-32	3/2/18
Fithian, Robert G.	H-10	9/15/17	Foy, William J.	H-3	7/28/17
Flachsenhar, W. R.	H-9	9/8/17	Frame, Archibald E.	M-62	10/26/18
*Fladd, A. S.	H-2	7/21/17	Francis, Paul R.	H-35	3/23/18
Fladeland, John E.	H-40	4/27/18	Frankley, Lawrence W.	H-27	1/26/18
Fleishman, Charles R.	M-59	10/5/18	Frazier, Delmar J.	M-66	11/23/18
Fleming, John C.	M-46	6/29/18	Freebairn, Archibald	M-56	9/14/18
Fleming, William C.	M-54	8/31/18	Freedman, Mark A.	H-31	2/23/18
Fletcher, Charles A.	M-65	11/16/18	Freeman, Harold A.	M-62	10/26/18
Fletcher, Wallace R.	H-39	4/20/18	Freeman, Orville B.	H-39	4/20/18
Flick, John A.	K-72	12/21/18	Freeman, Stuart	H-15	10/20/17
Flint, Rockwood	H-13	10/6/17	Freeman, William J.	K-70	12/7/18
Flood, Edmund L.	M-44	6/15/18	Freeman, Elmer L.	M-56	9/14/18
Flood, Edmund R.	M-56	9/14/18	French, Everett O.	M-65	11/16/18
Floyd, Ralph A.	H-16	10/27/17	French, Frederick M.	M-52	8/10/18
Fluor, Peter E.	I-40	5/4/18	French, Irvine	H-30	2/16/18
Fogarty, John L.	M-43	6/8/18	Friesen, Ernest C.	H-26	1/19/18
Foley, Andrew E.	H-37	4/6/18	Freisner, James T.	M-45	6/22/18
Foley, William R.	H-40	4/27/18	Frost, John A.	H-34	3/16/18
Folland, Sidney J.	I-40	5/4/18	Frost, William O.	H-8	9/1/17
Follett, Paul B.	M-61	10/19/18	Fry, George M.	M-62	10/26/18
Follette, Justin P.	H-11	9/22/17	Fry, Robert D.	M-52	9/10/18
Foque, Edwin N.	H-21	12/1/17	Fry, Ralph L.	K-70	12/7/18

Total to bottom of this sheet - 910

*Did not successfully pass all examinations but was ordered to San Diego before results of examinations were known. Included among the graduates inasmuch as he took all the work and was not discharged from this school.

Total to bottom of this sheet - 91¢

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Frye, William A.	H-12	9/29/18	Garrison, Ralph H.	H-36	3/30/18
Freydig, Paul E.	H-10	9/15/17	Gaspar, Lee F.	H-36	3/30/18
Fulenwider, Harold G.	M-54	8/31/18	Gates, Fred H.	M-43	6/8/18
Fulmer, Harry B.	M-57	9/21/18	Gates, Miles W.	M-46	6/29/18
Füllenwider, Robert C.	K-72	12/21/18	Geary, Richard E.	M-57	9/21/18
Fuller, Earl B.	H-12	9/29/17	Geary, Roland W.	H-24	12/22/17
Fuller, Francis C. Jr.	M-58	9/28/18	Gehan, Jerome S.	H-39	4/20/18
Fuller, I. F.	H-6	8/18/17	Geier, Phillip E.	H-31	2/23/18
Fuller, Robert N.	H-29	2/9/18	Gelvin, Clyde R.	L-42	5/25/18
Fullerton, Edward	H-17	11/3/17	Gentry, Ira H.	M-67	11/30/18
Fulton, Carol D.	H-31	2/23/18	George, Abram N.	H-20	11/24/17
Fultz, Carter C.	M-59	10/5/18	Getchell, Charles W.	H-40	4/27/18
Funke, Rimo G.	M-49	7/20/18	Geyer, Edward C.	H-19	11/17/17
Furber, Melville S.	K-77	2/1/19	Gibbs, Ronald D.	M-49	7/20/18
Gabbert, Thomas A.	H-37	4/6/18	Gibson, Fred E.	M-62	10/25/18
Gabel, T. A.	H-5	8/11/17	Gibson, Julius R.	H-38	4/13/18
Gaines, Paul	M-63	11/2/18	Gibson, Robert C.	H-40	4/27/18
Gale, G. H.	H-1	7/14/17	Giffin, James L.	H-25	1/19/18
Gale, James C.	H-34	3/16/18	Gilbert, Arthur C.	H-38	4/13/18
Gale, Rex C.	H-37	4/6/18	Gilbert, Francis M.	I-40	5/4/18
Galehouse, I.	H-5	8/11/17	Gilfillan, William E.	H-36	3/30/18
Gallacher, Cyril I.	M-59	10/5/18	Gill, Glennis D.	M-56	9/14/18
Gallagher, Dudley E.	M-66	11/23/18	Gill, R. J.	H-1	7/14/17
Gallup, Burton A.	H-29	2/9/18	Gillelen, Luet G.	M-55	9/7/18
Galvin, A. M.	H-2	7/21/17	Gilliland, Charles W.	M-56	9/14/18
Galvin, James M.	I-40	5/4/18	Gillis, Edward W.	M-57	9/21/18
Game, Hubert P.	H-21	12/1/17	Gilmore, Clarence E.	M-55	9/7/18
Garbett, George A.	M-57	9/21/18	Gilmore, Donald H.	H-20	11/24/17
Garbutt, Earl E.	H-13	10/6/17	Gilmore, Robert L.	K-74	1/11/19
Garbutt, John D.	H-36	3/30/18	Glennon, Herbert L.	I-40	5/4/18
Gardner, F. J.	H-5	8/11/17	Glennon, John J.	M-59	10/5/18
Gardner, John H.	H-24	12/22/17	Glos, Walter Adams	H-31	2/23/18
Gardner, Roger K.	K-72	12/21/18	Glover, Alva M.	M-58	9/28/18
Garn, Jacob E.	M-59	10/5/18	Godbe, Raymond	M-65	11/16/18
Garrison, Murray E.	M-53	8/24/18	Godman, Louis E.	H-11	9/22/17

Total to bottom of this sheet - 980

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Goetjen, Floyd L.	H-34	3/16/18	Grant, Henry W.	M-63	11/2/18
Goff, Ivan L.	M-50	7/27/18	Grantz, Ray L.	H-7	8/25/18
Goldberg, Manual M.	M-61	10/19/18	Graves, Harold D.	M-53	8/24/18
Goldsmith, Nathaniel J.	K-69	11/30/18	Graves, Nelson F.	M-63	11/2/18
Goldsworthy, Raymond E.	M-54	8/31/18	Graves, Orville R.	M-58	9/28/18
Golonsbe, George J.	H-24	12/22/17	*Graves, Thomas E.	H-3	7/28/17
Gonyon, Harvey L.	M-60	10/12/18	Gray, Clarence D.	M-58	9/28/18
Goode, Henry W.	H-29	2/9/18	Gray, John C.	M-64	11/9/18
Goodell, Percy W.	M-50	7/27/18	Gray, J. F.	H-7	8/25/18
Goodfellow, Jack	M-58	9/28/18	Gray, Ralph C.	H-22	12/8/17
Goodhue, George T.	M-57	9/21/18	Graybeal, Carlyle W.	M-47	7/6/18
Gooding, Carlos C. Van	H-29	2/9/18	Grazier, Oliver Earl	H-34	3/16/18
Gooding, Charles C.	M-46	6/29/18	Green, Wilber A.	M-43	6/8/18
Gooding, Jack E.	K-72	12/21/18	Greenberg, Stuart N.	M-61	10/19/18
Goodman, Byron M.	M-44	6/15/18	Greene, Bert R.	M-40	4/27/18
Goodrich, Augustus	H-36	3/30/18	Greene, Lew A.	M-35	3/23/18
Goodwin, Harold C.	H-36	3/30/18	Greenman, Fred W.	I-40	5/4/18
Gore, Frank D.	H-37	4/6/18	Greenlee, Albert D.	M-50	7/27/18
Goree, Jonathan D.	H-33	3/9/18	Greenwood, Chester L.	H-18	11/10/17
Goree, Rogers C.	H-29	2/9/18	Gregg, Albert E.	M-44	6/15/18
Goss, Lewis W.	H-30	2/16/18	Greppin, Lloyd E.	M-51	8/3/18
Gowans, Louis L.	H-30	2/16/18	Grey, George V.	H-8	9/1/17
Gowen, W. W.	H-40	4/27/18	Griffin, Benjamin F.	H-23	12/15/17
Grabill, Blaine C.	M-50	7/27/18	Griffin, Carl W.	M-46	6/29/18
Gradle, Roy S.	M-54	8/31/18	Griffith, Ralph E.	M-45	6/22/18
Grady, Harold H.	H-35	3/23/18	Grimm, John E. Jr.	H-31	2/23/18
Grady, John W.	M-55	9/14/18	Grimmer, W. E.	H-9	9/8/17
Graham, Garratt H.	H-33	3/9/18	Griswold, Edwin	H-14	10/13/17
Graham, Gerald	M-46	6/29/18	Groesbeck, Grant A.	M-59	10/5/18
Graham, Harlan B.	H-28	2/2/18	Gross, Lloyd C.	M-64	11/9/18
Graham, James M.	M-48	7/13/18	Grossman, Walter G.	K-69	11/30/18
Graham, Maurice F.	H-16	10/27/17	Grover, Richard B.	M-52	8/10/18
Graham, Russell	H-12	9/29/17	Grussendorf, Walter H.	M-66	11/23/18
Granfield, Thomas H.	H-30	2/16/18	Guernsey, Henry B.	M-51	8/3/18
Grant, Barton S.	K-70	12/7/18	Guild, John M.	M-50	7/27/18

Total to bottom of this sheet - 1050

*Did not successfully pass all examinations but was ordered to San Diego before results of examinations were known. Included among the graduates inasmuch as he took all the work and was not discharged from this school.

Detjen, Floyd L.	M-24	[illegible], Henry W.	
Dill, Ivan L.	[illegible]	[illegible], [illegible]	
[illegible], Lemuel M.	[illegible]	[illegible], [illegible]	
Dibblewitt, [illegible]	M-39	[illegible], Lenton E.	
[illegible]	[illegible]	[illegible], Orville W.	
Dolomble, George G.	[illegible]	Edwards, Thomas E.	
Dooyon, Harry [illegible]	[illegible]	[illegible], Ulysses D.	—
Doode, Henry W.	[illegible]	[illegible], John O.	
Doofoll, Percy W.	[illegible]	[illegible], G. F.	
Doofellow, [illegible]	[illegible]	[illegible], Morton C.	—
Dooding, Curtis G.	[illegible]	[illegible]	
Dooking, Jack M.	[illegible]	Greenberg, Stuart B.	M-23
Doodmur, Byron M.	[illegible]	[illegible], Jack K.	
Doofrich, August	[illegible]	[illegible], [illegible]	
[illegible], Harold O.	[illegible]	[illegible], [illegible]	
Dore, Frank G.	[illegible]	Croushore, Albert D.	
[illegible], [illegible]	[illegible]	[illegible], Chesbro E.	—
Dree, Rogers O.	[illegible]	[illegible], [illegible]	
Dris, Levis W.	[illegible]	[illegible], Floyd R.	
Drma, Louis L.	[illegible]	[illegible], [illegible]	—
Dr, [illegible]	[illegible]	Griffin, Benjamin F.	—
Drvill, [illegible]	[illegible]	Griffin, Odell W.	—
Drwdie, Roy S.	M-23	Griffith, Ralph M.	—
Drudy, Harold L.	[illegible]	Grimm, John E. Jr.	
Drudy, John A.	—	[illegible], W. E.	
Drum, Bennett M.	[illegible]	Grinstead, [illegible]	
Drumm, Le [illegible]	[illegible]	[illegible], Grant L.	M-39
Drumm, Norton F.	[illegible]	[illegible], Lloyd C.	
Drumm, James A.	[illegible]	Grossman, Harvey G.	M-39
[illegible], Leonard I.	M-16	[illegible], Leonard B.	M-42
Drumm, Russell	[illegible]	[illegible], Luther E.	
[illegible], Thomas L.	[illegible]	[illegible]	M-23
[illegible], Arthur A.	[illegible]	[illegible], [illegible]	

Successfully pass all examination but was ordered to San Diego before graduation.

Graduates - School of Military Aeronautics,- Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Gulbransen, Fred S.	M-61	10/19/18	Hands, Stanley M.	H-30	2/16/18
Gumm, Percy E.	M-65	11/16/18	Handy, Homer A.	H-28	2/2/18
Gunerson, Morris E.	K-78	2/1/19	Hanes, H. F.	H-5	8/11/17
Guthrie, Clifford B.	H-30	2/16/18	Hanger, Emmett F.	M-46	6/29/18
Gwin, Ira A.	M-46	6/29/18	Hanglin, Edward J.	K-71	12/14/18
Gwin, Stanford	H-37	4/6/18	Hankins, Nathaniel R.	K-77	2/1/19
Haasis, Paul W.	M-65	11/16/18	Harding, Clarence W.	H-40	4/27/18
Haddock, James P.	H-33	3/9/18	Harding, Roland R.	H-30	2/16/18
Haddon, Julian B.	H-18	10/11/17	Harding, Roy E.	H-32	3/2/18
Hafen, Guy	M-57	9/21/18	Harding, William K.	H-38	4/13/18
Hageman, Ernest L.	M-65	11/16/18	Hargrove, Joseph R.	K-74	1/11/19
Hagenah, Harry B.	K-50	7/27/18	Harkins, William H.	H-23	12/15/17
Hagerman, Ivan L.	K-70	12/7/18	Harkness, Harry C.	M-51	8/3/18
Haggerty, Charles	M-62	10/26/18	Harmon, Jack	I-40	5/4/18
Haigh, Henry W.	H-30	2/16/18	Harned, Doyce H.	H-36	3/30/18
Haight, Raymond L.	M-55	9/7/18	Harp, Russell E.	M-60	10/12/18
Haines, Frank B.	H-25	1/12/18	Harriman, Frank A.	M-46	6/29/18
Hajek, William J.	H-30	2/16/18	Harrington, Sidney L.	M-45	6/22/18
Hale, January R.	H-28	2/2/18	Harris, Alfred R.	H-31	2/23/18
Haley, William J.	M-52	8/10/18	Harris, John A.	M-48	7/13/18
Hall, Norman S.	H-34	3/16/18	Harris, Joseph P.	H-39	4/20/18
Hall, Spencer	M-43	6/8/18	Harris, M. R.	H-1	7/14/17
Hall, T. D.	H-9	9/8/17	Harris, William L.	H-18	11/10/17
Halverson, Harry A.	H-39	4/20/18	Harrison, Gilbert H.	M-65	11/16/18
Hamann, William P.	M-29	2/9/18	Harrison, Landreth M.	H-30	2/16/18
Hamilton, Fred V.	M-54	8/31/18	Harrison, Thomas E.	M-51	8/3/18
Hampton, John C.	H-40	4/27/18	Harrod, LeRoy H.	M-58	9/28/18
Hamner, Earl M.	H-3	7/28/17	Harrold, James E.	H-16	10/27/17
Hammer, Harold D.	M-61	10/19/18	Harvey, I. J. Jr.	M-60	10/12/18
Hamner, Lunsford L.	M-61	10/19/18	Hart, Louis I.	M-57	9/21/18
Hammett, Irving R.	H-31	2/23/18	Hart, Victor K.	I-40	5/4/18
Hammond, Arthur M.	K-77	2/1/19	Hartman, Harry B.	H-3	7/28/17
Hammond, Edward J.	M-46	6/29/18	Hartsough, Ralph C.	H-36	3/30/18
Hanchett, Frederick W.	H-25	1/12/18	Hartt, Odber R.	H-29	2/9/18
Hand, Julius M.	H-31	2/23/18	Hartwell, Harry H.	M-55	9/6/18

Total to bottom of this sheet - 1120

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Haskell, Albert N.	H-37	4/6/18	Heath, Harry R.	M-60	10/12/18
Hastings, John L.	H-12	9/29/17	Heath, Ronald W.	K-77	2/1/19
Hastings, Morris O.	H-30	2/16/18	Hebbard, Charles B.	H-34	3/16/18
Hatch, W. M.	H-1	7/14/17	Heber, Harry E.	M-61	10/19/18
Hauck, Walter J.	M-60	10/12/18	Hebert, Gilbert A.	M-61	10/19/18
Haug, Edward	H-25	1/12/18	Heede, Charles E.	M-56	9/14/18
Hausman, William A.	H-36	3/30/18	Heg, Hans C.	M-43	6/8/18
Haverkorst, Walter B.	I-40	5/4/18	Heintz, Howard	M-17	11/3/17
Haw, Harry H.	M-52	8/10/18	Heisner, Charles L.	H-37	4/6/18
Hawkes, Francis M.	H-33	3/9/18	Heisen, H. H.	H-5	8/11/17
Hawkes, James L.	M-58	9/28/18	Helgesson, Henry T.	H-33	3/9/18
Hawkins, Ralph R.	H-31	2/23/18	Hellman, Richard H.	H-33	3/9/18
Hawks, Howard W.	M-58	9/28/18	Hemenway, Willard H.	M-48	7/13/18
Hawks, Kenneth H.	M-59	10/5/18	Henderson, George C.	M-47	7/6/18
Hawley, Willis M.	M-60	10/12/18	Henderson, Norbert K.	M-46	6/29/18
Haworth, George W.	H-38	4/13/18	Henderson, James D.	H-57	9/21/18
Hay, Laurence C.	M-49	7/20/18	Hendricks, Normal	I-40	5/4/18
Hayden, Albert A.	M-52a	8/17/18	Heney, Seth T.	M-55	9/7/18
Hayden, Max E.	H-29	2/9/18	Henkle, Lionel M.	M-54	8/31/18
Hayes, Benjamin H.	H-36	3/30/18	Henley, William C.	H-26	1/19/18
Hayes, George .	K-79	11/30/18	Henninger, Guy N.	M-56	9/14/18
Hayes, James C.	M-58	9/28/18	Henry, Kenneth M.	H-36	3/30/18
Haygood, Paul	M-60	10/12/18	Henry, Percy C. Jr.	H-32	3/2/18
Haynes, Richard O.	I-40	5/4/18	Henry, W. H.	H-4	8/4/17
Haynes, Robert E.	M-48	7/13/18	Henshaw, Stanley T.	M-66	11/23/18
Hayne, Robert Y.	M-61	10/19/18	Henshaw, Thomas D.	H-37	4/6/18
Hays, Earl S.	H-39	4/20/18	Hepburn, Ralph R.	M-64	11/9/18
Hazeltine, Matthew E.	H-36	3/30/18	Herbert, James E.	M-61	10/19/18
Hazelton, Earle F.	M-49	7/20/18	Herring, C.	H-8	9/1/17
Hazelwood, Norman G.	M-55	9/7/18	Herman, Fred W.	M-61	10/19/18
Hazzard, R. J.	H-7	8/25/17	Herrmann, Gerald F.	M-34	3/16/18
Heacock, Homer B.	K-69	11/30/18	Herron, Mark	H-8	8/18/17
Healy, Edwin G.	H-23	12/15/17	Hewitt, Clarence G.	H-30	2/16/18
Healy, Frank D.	H-11	9/22/17	Hiatt, John	H-38	4/13/18
Healy, Nicholas C.	H-33	3/9/18	Hickam, Laurence B.	M-49	7/20/18

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Name	Pos.	Organization	Name	Pos.
Beloin, Albert H.	C-C	Ely Co.	Mr. Harry R.	—
Bingo, John L.	P-R	[illegible]	[illegible] Donald L.	[illegible]
Bruning, Dorris O.	C-D	Z,Z,Z/ZC	Behrend, Chester —	—
[illegible]	P-C	Z/Z/Z/Z	[illegible] Henry D.	[illegible]
Bunck, Walter G.	P-C	[illegible]	[illegible] Lawrence R.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Glenlen H.	[illegible]
[illegible] William A.	[illegible]	Z/Z/Z/Z	[illegible] Hans O.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Forrest	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Chester L.	[illegible]
[illegible] Dorothy M.	[illegible]	[illegible]	[illegible] M. E.	[illegible]
[illegible] Grace L.	[illegible]	Z/Z/Z/Z	[illegible] Harry T.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Richard H.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Millard H.	[illegible]
[illegible] Kenneth M.	[illegible]	[illegible]	[illegible] George C.	[illegible]
[illegible] Willie M.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Gene A.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Thomas	[illegible]
[illegible] Harry	[illegible]	Z,Z,Z/Z	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Richard M.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Georgia M.	[illegible]	[illegible]	[illegible] Roy R.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Kenneth M.	[illegible]
Hargood, Paul	[illegible]	[illegible]	[illegible] Percy O. Jr.	[illegible]
[illegible] Alexander O.	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Robert M.	[illegible]	[illegible]	[illegible] Sherley C.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible] Hobart X.	[illegible]	[illegible]	[illegible] Thomas E.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Jaeschke, Herbert M.	[illegible]	[illegible]	[illegible] Grover L.	[illegible]
[illegible] Curtis T.	[illegible]	[illegible]	[illegible] O.	[illegible]
Kaelwood, Herman O.	[illegible]	[illegible]	[illegible] Boyd V.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Donald P.	[illegible]
[illegible] Norris T.	[illegible]	[illegible]	Larson, Hank	[illegible]
Leahy, Edwin O.	[illegible]	[illegible]	[illegible] Clarence W.	[illegible]
[illegible]	[illegible]	[illegible]	[illegible] Jack	[illegible]
Leahy, Nicholas O.	[illegible]	[illegible]	[illegible]	[illegible]

Total to bottom of this sheet - 1150

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Higgins, Charles C.	H-23	12/15/17	Hook, James S.	M-58	9/28/18
Higgins, Irvin J.	H-11	9/22/17	Hooper, Harley L.	H-34	3/16/18
Hildebrand, Floyd R.	H-40	4/27/18	Hooper, Merlin C.	H-35	3/23/18
Hileman, David J.	H-40	4/27/18	Hoppin, Marshall C.	M-65	11/16/18
Hill, C. E.	H-4	8/4/17	Hopkins, George W.	I-40	5/4/18
Hill, C. L.	H-5	8/11/17	Horton, William C.	H-41	5/11/18
Hill, Julius C.	M-55	9/7/18	Horman, Wesley L.	M-60	10/12/18
Hilton, Kirk E.	M-45	6/22/18	Horrell, Camden R.	H-24	12/22/17
Hines, LeRoy	H-25	1/12/18	Horrigan, Thomas F.	H-30	2/16/18
Hirsch, Charles L.	H-31	2/23/18	Horsley, Frederick	M-63	11/2/18
Hitchcock, R. W.	H-9	9/8/17	Horton, Russell S.	H-35	3/23/18
Hoag, Earl S.	H-3	7/28/17	Hosford, George M.	M-43	6/8/18
Hobbs, Clarence W.	M-50	7/27/18	Hosier, Harmon E.	M-52	8/24/18
Hodge, Glenn B.	H-33	3/9/18	Hossack, Orlo R.	M-54	8/31/18
Hodge, Robert R.	H-35	3/23/18	Hostetler, Ivan P.	M-46	6/29/18
Hoerner, John L.	M-52	8/10/18	Hough, Walker B.	M-53	8/24/18
Hoey, Henry J.	M-43	6/8/18	Houghton, Earl	H-12	9/29/17
Hoff, William H.	H-3	7/28/17	Houghton, Robert A.	M-44	6/15/18
Hofflund, John L.	H-20	11/24/17	House, William B.	H-24	12/22/17
Hoffman, Verne W.	H-23	12/15/17	Houssels, John K.	M-62	10/26/18
Hogan, H. O.	H-4	8/4/17	Houston, Paul W.	M-47	7/6/18
Hogue, Mark C.	H-35	3/23/18	Howard, E. P.	H-9	9/8/17
Hoisholt, Arne K. B.	M-16	10/27/17	Howard, Harold H.	H-33	3/9/18
Holbrook, Darley A.	M-51	8/3/18	Howard, James H.	M-60	10/12/18
Holl, Frederick G.	M-59	10/5/18	Howell, Arthur B.	M-53	8/24/18
Holland, Robert L.	M-51	8/3/18	Howells, Edmund H.	M-59	10/5/18
Holloway, Halbert H.	H-14	10/13/17	Howeth, Woodfin G.	H-28	2/2/18
Holmes, Charles R.	M-51	8/3/18	Hoye, William W.	M-52a	8/17/18
Holmes, Harry L.	M-54	8/31/18	Hoyt, Fred D.	H-27	1/26/18
Holt, Hobart C.	M-44	6/15/18	Hoyt, Richard H.	M-43	6/8/18
Holt, John R.	M-60	10/12/18	Hoyt, Werner F.	H-33	3/9/18
Holzberger, Lloyd F.	M-57	9/21/18	Hruda, Adolph H.	H-29	2/9/18
Honeywell, Charles F.	M-46	6/29/18	Hubbard, Clyde W.	M-59	10/5/18
Honn, Lawrence G.	H-30	2/16/18	Hubbard, Lyle	H-38	4/13/18
Hood, Wallace J.	M-52a	8/17/18	Hudspeth, Clyde E.	H-35	3/23/18

Total to bottom of this sheet - 1260

[illegible], Duncan C.	[illegible]	[illegible]	[illegible], Ralph T.	[illegible]	[illegible]
[illegible], Irvin J.	[illegible]	[illegible]	[illegible], Peter W.	[illegible]	[illegible]
[illegible], David J.	[illegible]	[illegible]	[illegible], Mark L.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Douglas M.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], George H.	[illegible]	[illegible]
[illegible], C. E.	[illegible]	[illegible]	Morton, William C.	[illegible]	[illegible]
[illegible], Melvin J.	[illegible]	[illegible]	Norman, Jerry L.	[illegible]	[illegible]
[illegible], Mark E.	[illegible]	[illegible]	Norvell, Gordon R.	[illegible]	[illegible]
[illegible], Leroy	[illegible]	[illegible]	Norwigian, Thomas P.	[illegible]	[illegible]
[illegible], Charles L.	[illegible]	[illegible]	[illegible], Theodore	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Russell	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], George W.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
[illegible], Glenn	[illegible]	[illegible]	[illegible], Orlo R.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Ivan P.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Walter J.	[illegible]	8/24/18
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Lloyd	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Robert A.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	11/24/17	[illegible], William H.	M-24	12/23/17
[illegible], [illegible]	[illegible]	[illegible]	[illegible], John K.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Paul F.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
[illegible], Arno W.	[illegible]	[illegible]	[illegible], Harold R.	[illegible]	[illegible]
[illegible], Delay A.	[illegible]	[illegible]	[illegible], Hans H.	M-40	[illegible]
[illegible], [illegible]	[illegible]	10/1/18	[illegible], Arthur B.	[illegible]	8/24/18
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Edward R.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
[illegible], Vincent E.	[illegible]	[illegible]	[illegible], [illegible]	[illegible]	[illegible]
[illegible], Harry L.	[illegible]	[illegible]	[illegible], Fred D.	[illegible]	1/29/18
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Elmer M.	[illegible]	[illegible]
[illegible], John R.	[illegible]	[illegible]	[illegible], Oscar W.	[illegible]	8/9/18
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Adolph K.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Edward T.	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	[illegible]	[illegible], Lyle	[illegible]	[illegible]
[illegible], [illegible]	[illegible]	8/17/18	[illegible], [illegible]	M-58	[illegible]

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Huggins, Maurice L.	M-60	10/12/18	Ivey, Thomas E. Jr.	M-56	9/14/18
Hughes, Donald B.	H-13	10/6/17	Ivie, Horace E.	M-54	8/31/18
Hughes, Robert W.	H-37	4/6/18	Ivie, Norval A.	M-54	8/31/18
Humphrey, Forest T.	M-50	7/27/18	Jackman, Charles H.	H-39	4/20/18
Hunt, W. Jackson	H-3	7/28/17	Jackson, Charles R.	M-67	11/30/18
Hunt, Spencer S.	H-30	2/16/18	Jackson, John W.	H-36	3/30/18
Hunter, Henry H.	H-32	3/2/18	Jacobberger, Hubert E.	M-54	8/31/18
Hunter, Richard E.	M-56	9/14/18	Jacobi, Gustav R.	M-54	8/31/18
Hunter, William E.	M-45	6/22/18	Jacobs, John F.	H-29	2/9/18
Huntington, Cecil S.	H-15	10/20/17	Jackson, Byron Jr.	H-21	12/1/17
Huntington, Ralph O.	H-30	2/16/18	Jacobsen, Chester J.	H-26	1/19/18
Huntley, Frank A.	M-53	8/24/18	Jacobson, Hjalmar A.	M-56	9/14/18
Huntoon, Clarence S.	H-37	4/6/18	Jacomini, Clement Jr.	H-33	3/9/18
Huntsberger, Paul	K-74	1/11/19	Jacquemart, Eugene A.	H-27	1/26/18
Huot, Etol S.J.	M-54	8/31/18	Jaeger, Otto	H-25	1/12/18
Hurd, Charles S.	H-39	4/20/18	James, Hubert S.	H-11	9/22/17
Hurd, L. D.	H-9	9/8/17	James, John R.	H-32	3/2/18
Hurlbut, Gordon B.	M-59	10/5/18	James, Roy P.	H-18	11/10/17
Hurst, Donald C.	M-44	6/15/18	Jameson, Charles M.	M-56	9/14/18
Huse, Edwin E.	M-55	9/7/18	Janssen, Edward A. Jr.	H-31	2/23/18
Hutchinson, William B.	H-40	4/27/18	Jaqua, Albert R.	M-57	9/21/18
Hyde, Archie W.	K-69	11/30/18	Jaqua, John B.	H-3	7/28/17
Hyde, Charles L.	H-30	2/16/18	Jarmuth, Douglas	H-39	4/20/18
Hyde, Gordon E.	H-30	2/16/18	Jayne, Frederick M.	M-56	9/14/18
Hyde, Harley C.	M-51	8/3/18	Jeffries, Simeon J.Jr.	H-24	12/22/17
Hyman, Alvin D.	H-17	11/3/17	Jenks, Henry I.	H-28	2/2/18
Hyman, Joseph M.	M-49	7/20/18	Jennings, Edward B.	M-56	9/14/18
Illgenfritz, Frank W.	M-50	7/27/18	Jensen, Charles C.	H-25	1/12/18
Illich, Jerry T.	H-8	9/1/17	Jensen, Harold W.	M-50	7/27/18
Illse, H. A.	H-1	7/14/17	Jensen, Jack J.	M-53	8/24/18
Ingle, Joseph L.	H-24	12/22/17	Jessen, Ralph F.	M-60	10/12/18
Irish, Johnson	M-58	9/28/18	Jewett, Franklin F.	H-14	10/13/17
Irving, L. G.	H-5	8/11/17	Jewett, George D.	H-19	11/17/17
Isaacs, Charles W.Jr.	H-41	5/11/18	Johannsen, Victor A.	M-50	7/27/18
Iverson, Roderick M.	H-30	2/16/18	Johnson, Adolph C.	M-48	7/13/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Johnson, August P.	M-51	8/3/18	Jordan, Leonard K.	M-52	8/10/18
Johnson, Bayard	H-22	12/8/17	Jorgenson, Ralph W.	M-54	8/31/18
Johnson, Ben H.	M-45	6/22/18	Jorres, Gustave W.	M-49	7/20/18
Johnson, Bryan G.	M-57	9/21/18	Jouvenot, Victor F.	M-44	6/15/18
Johnson, Clark M.	K-77	2/1/19	Joyce, Thomas H.	H-37	4/6/18
Johnson, David R.	K-77	2/1/19	Jubell, Albert E.	L-68	11/30/18
Johnson, Delbert K.	H-40	4/27/18	Judd, George T.	M-56	9/14/18
Johnson, Earl S.	H-40	4/27/18	Judge, Joseph B.	H-24	12/22/17
Johnson, George T.	H-30	2/16/18	Jump, Frank R.	M-47	7/6/18
Johnson, Justin L.	H-20	11/24/17	Junkin, Allen V.	M-42	6/1/18
Johnson, Marvin P.	M-44	6/15/18	Jurden, Leonard W.	H-29	2/9/18
Johnson, Myron A.C.	I-40	5/4/18	Juul, Einer P.	K-69	11/30/18
Johnson, Voyle C.	M-56	9/14/18	Kahler, Edward D.	H-23	12/15/17
Johnson, Walter R.	H-38	4/13/18	Kamm, Phillip S.	H-37	4/6/18
Johnsson, Elmer E.	H-11	9/22/17	Kanawyer, Ray J.	K-76	1/25/19
Johnston, D.	H-1	7/14/17	Karns, W. E.	H-2	7/21/17
Johnston, Harold W.	I-40	5/4/18	Katz, Benjamin N.	M-53	8/24/18
Johnston, John C.	K-77	2/1/19	Kearney, R. W.	H-6	8/18/17
Jolly, James S.	H-18	11/10/17	Kearns, Thomas F.	M-43	6/8/18
Jones, Alwin A.	M-64	11/9/18	Keightley, George M.	K-42	5/18/18
Jones, Clifford E.	H-32	3/2/18	Keine, George P.	L-68	11/30/18
Jones, Clinton	H-16	10/27/17	Keller, Clarence K.	H-24	12/22/17
Jones, Delbert E.	H-20	11/24/17	Keller, Dallas C.	H-36	3/30/18
Jones, Donald T.	H-36	3/30/18	Keller, Frederick W.	H-24	12/22/17
Jones, Elmer H.	H-29	2/9/18	Kelley, William M.	H-37	4/6/18
Jones, Elton L.	M-51	8/3/18	Kellogg, Harold B.	M-49	7/20/18
Jones, Ernest E.	H-36	3/30/18	Kelly, Fred W.	H-18	11/10/17
Jones, Fred L.	H-24	12/22/17	Kelly, H. R.	H-2	7/21/17
Jones, Guy P.	M-58	9/22/18	Kelly, James A.	M-50	7/27/18
Jones, Ogden S.	M-49	7/20/18	Kelly, Joseph E.	M-54	8/31/18
Jones, Richard H.	H-36	3/30/18	Kelly, Leo J.	M-57	9/21/18
Jones, Roland E.	M-60	10/12/18	Kelly, Oakley G.	H-30	2/16/18
Jones, Roy F.	M-58	9/28/18	Kelly, Ralph M.	H-33	3/9/18
Jones, Roy L.	H-36	3/30/18	Kelly, Roland D.	H-30	2/16/18
Jordan, Henry E.	M-66	11/23/18	Kelso, Floyd L.	I-40	5/4/18

Total to bottom of this sheet - 1400

Johnson, Ernest P.							
Johnson, [illegible]				Jorgenson, Ralph T.			
Johnson, Ann R.				[illegible], Victor E.			7/20/76
[illegible], [illegible] B.							
[illegible], Mark V.			2/1/76				
Johnson, David R.				Kidd, Albert D.			
Johnson, Carl S.				[illegible], George A.			
[illegible], [illegible] L.				[illegible], Frank D.			7/3/76
[illegible], [illegible] L.							
Johnson, [illegible] T.			3/15/76	Leonard E.			2/9/76
[illegible], [illegible]				Hall, John F.			
[illegible], [illegible]				[illegible], [illegible]			12/16/76
[illegible], [illegible]				[illegible], [illegible]			
[illegible], [illegible]				[illegible], [illegible]			
[illegible], [illegible]				[illegible], [illegible]			
Johnson, Harold				[illegible], [illegible]			7/21/77
Johnson, John C.				[illegible], [illegible]			8/25/75
[illegible], [illegible]				[illegible], [illegible]			8/10/77
[illegible], Alvin J.				Ley, George M.			
Jones, Clifford R.				[illegible], George F.			
[illegible], Brinton				Lee, Clarence K.			
[illegible], [illegible]				[illegible], [illegible]			
Jones, [illegible]				[illegible], Lawrence R.			
[illegible], Isaac L.				[illegible], William M.			
Jones, [illegible]				Clegg, Harold F.			
Jones, [illegible] E.				[illegible], [illegible]			
[illegible], [illegible]				[illegible], [illegible]			
Jones, [illegible]			9/22/76	[illegible], [illegible]			
[illegible], [illegible]				[illegible], Joseph M.			
Jones, [illegible]				Kelly, Leo J.			8/21/1
Jones, [illegible]				[illegible], [illegible]			
Jones, [illegible]				[illegible], [illegible]			
[illegible], Roy L.				Lee, Richard D.			
[illegible], [illegible]				[illegible], Floyd I.			

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Kendrick, Frank E.	M-43	6/8/18	Kirkpatrick, Russell O.	M-56	9/14/18
Kendrick, Robert T.	M-45	6/22/18	Kirton, Ross W.	M-62	10/26/18
Keniston, Harry C.	H-19	11/17/17	Kirsch, Gifford K.	I-40	5/4/18
Kennedy, James H.	H-24	12/22/17	Kitchel, Milton P.	M-45	6/22/18
Kennedy, John R. P.	M-50	7/27/18	Klemmedson, Arthur E.	M-54	8/31/18
Kennedy, Robert E.	H-29	2/9/18	Klingaman, Earl J.	H-30	2/16/18
Kenny, James B.	H-31	2/23/18	Kloke, Donald C.	H-31	2/23/18
Kent, Thomas T.	H-29	2/9/18	Klosky, S.	H-4	8/4/17
Kenyon, Clarence F.	L-68	11/30/18	Knapp, Frank R.	M-52a	8/17/18
Kenyon, H. S.	H-1	7/14/17	Kneeland, Louis G.	M-65	11/16/18
Kern, Carl A.	M-64	11/9/18	Knettle, Lemyrt D.	H-36	3/30/18
Kern, John T.	I-40	5/4/18	Knode, Thomas E.	I-41	5/11/18
Kerr, Archibald G.	K-76	1/25/19	Knowlton, Philip A.	M-52	8/10/18
Kerr, Robert W.	H-37	4/6/18	Knudson, Arthur L.	M-58	9/28/18
Kesemann, William Jr.	H-31	2/23/18	Kohler, Carlos C.	H-34	3/16/18
Kersetter, Frank L.	M-65	11/16/18	Koiner, Carl W.	H-24	12/22/17
Kesling, Erle E.	H-39	4/20/18	Kokjer, Thomas E.	M-51	8/3/18
Keys, Robert C.	M-62	10/26/18	Koppe, W. A.	H-2	7/21/17
Kilcline, William F.	H-23	12/15/17	Kopperud, Harmon	M-67	9/21/18
Killian, Edward K.	M-61	10/19/18	Koster, Harry B.	H-7	8/25/17
Kimball, Dan A.	M-26	1/19/18	Kregal, Mark G.	H-31	2/23/18
Kimball, Robert L.	M-51	8/3/18	Krieger, John E.	H-23	12/15/17
King, Alexander M.	H-29	2/9/18	Kuhlman, Roy A.	H-25	1/12/18
King, Edgar E.	M-55	9/7/18	Kyle, William F.	H-34	3/16/18
King, Frank L.	H-38	4/13/18	Lachmund, Harry G.	H-27	1/26/18
King, Wells R.	M-49	7/20/18	Lackey, Myron E.	M-44	6/15/18
*Kinn, L. E.	H-2	7/21/17	Ladd, Culver S.	M-67	11/30/18
Kinnear, James S.	H-40	4/27/18	LaForce, Washington B.	L-68	11/30/18
Kinney, C. A.	H-9	9/8/17	LaForce, W. Watson	H-16	10/27/17
Kinney, J. L.	H-2	7/21/17	Lahey, William P.	H-29	2/9/18
Kinney, Kenneth	H-37	4/6/18	Laidlaw, H. B.	H-6	8/18/17
Kirby, Frank J.	M-60	10/12/18	Lain, Thomas W.	K-70	12/7/18
Kirk, Charles L.	M-52a	8/17/18	Laird, Burnal L.	M-66	11/23/18
Kirk, Harris C.	H-40	4/27/18	Lakin, Paul L.	H-16	10/27/17
Kirkpatrick, Ross C.	H-25	1/12/18	Lamb, Warren F.	K-77	2/1/19

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*Did not successfully pass all examinations but was ordered to San Diego before results of examinations were known. Included among the graduates inasmuch as he took all the work and was not discharged from this school.

Henderson - School of Military Personnel - Duckster.

Appendix _____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Lamborn, Chester A.	M-51	8/3/18	Laws, Frederick	M-52a	8/17/18
Lamborn, Dewey L.	M-48	7/13/18	Lawson, Marion C.	M-57	9/21/18
Lamkin, William L.	H-23	12/15/17	Lawson, William E.	M-34	3/16/18
Lamoreaux, Lowell P.	H-36	3/30/18	Lawton, Merritt Lyon	M-35	3/23/18
Lamson, Oliver	H-40	4/27/18	Lea, Curry	I-40	5/4/18
Lane, Charles A.	H-40	4/27/18	Leche, David H.	M-58	9/28/18
Lane, David W.	H-24	12/22/17	Ledger, Winslow W.	H-24	12/22/17
Lanfall, John T.	H-14	10/13/17	Lee, Cecill C.	H-38	4/13/18
Langford, Harry	H-31	2/23/18	Leedy, Carl H.	M-56	9/14/18
Langstroth, Marshall	H-27	1/26/18	Leferink, Richard	H-25	1/19/18
Landers, Charles B.	M-55	9/7/18	Leffler, Claude W. S.	H-21	12/1/17
Landers, Sigmund F.	M-44	6/15/18	Leggett, George P.	H-31	2/23/18
Landreth, Eli H.	M-63	11/2/18	Leggett, K. C.	H-9	9/8/17
Lantz, Lyman S.	M-43	6/8/18	Lehman, Ralph	M-44	6/15/18
LaParle, Walter E.	M-37	4/6/18	Leib, William F.	H-29	2/9/18
Largent, Ralph N.	H-37	4/6/18	Leighninger, Robert E.	H-19	11/17/17
Larison, Charles C.	H-27	1/26/18	Leiser, Jesse B.	M-55	9/7/18
Larkin, George R.	H-27	1/26/18	Lendrum, Alexander M.	M-44	6/15/18
Larrecou, Emile A.	M-65	11/16/18	Lenihan, Thomas J.	H-3	7/28/17
Larsen, William S.	M-58	9/28/18	Lenox, Lionel T.	M-49	7/20/18
Larson, James W.	M-64	11/9/18	Leonard, Cecil E.	M-34	3/16/18
Larson, Lloyd C.	H-31	2/23/18	Leute, Karl M.	H-39	4/20/18
Larson, Russell C.	M-54	8/31/18	Levisse, Rexford B.	H-20	11/24/17
Larson, Westside T.	H-28	2/2/18	Levy, Sigmund	M-61	10/19/18
LaSalvia, James J.	K-69	11/30/18	Lewis, George H.	M-58	9/28/18
Lathrop, William M.	M-64	11/9/18	Lewis, Joe L.	M-61	10/19/18
LaToske, George H.	H-28	2/2/18	Lewis, Oliver I.	K-70	12/7/18
Lauerman, Otto S.	H-35	3/23/18	Lewis, Ralph E.	M-55	9/7/18
Lavelles, Michael J.	H-26	1/19/18	Lewis, Richard P.	H-27	1/26/18
Lavene, C. C.	H-7	8/25/17	Lewis, Robert	H-28	2/2/18
Lavigne, Francis A.	M-44	6/15/18	Lewis, William C.H.	M-33	3/9/18
Lawler, Victor F.	I-40	5/4/18	Lewis, William T.	M-61	10/19/18
Lawrence, Harry F.	H-28	2/2/18	Leyden, Edward A.	H-27	1/26/18
Lawrence, Henry D.	H-31	2/23/18	Liebhardt, Frederick C.	M-61	10/19/18
Lawrence, Lynn M.	M-45	6/15/18	Liebhauser, Edgar A.	H-22	12/8/17

Total to bottom of this sheet - 1540

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Liggett, Arthur G.	M-29	2/9/18	Lopez, Albert R.	M-48	7/13/18
Liggett, Ruel H.	M-56	9/14/18	Lorentz, Henry B.	M-54	8/31/18
Like, Ralph M.	M-48	7/13/18	Lorenz, H.	M-9	9/8/17
Likely, Robert D.	M-3	7/28/17	Love, Ernest A.	M-3	7/28/17
Lincoln, Elton P.	M-35	3/23/18	Love, George E.	M-59	10/5/18
Lindblad, William N.	M-40	4/27/18	Love, Milton H.	M-54	8/31/18
Lindersmith, Walter R.	M-52a	8/17/18	Lovett, Craig	K-42	5/18/18
Lindsey, William W.	M-18	11/10/17	Lovett, W. W.	M-2	7/21/17
Lindsley, Dan L.	M-35	3/23/18	Low, R. P.	M-8	9/1/17
Ling, Homer J.	M-14	10/13/17	Lowell, George C.	M-33	3/9/18
Linton, Harry J.	M-56	9/14/18	Lowrey, Gerald R.	M-58	9/28/18
Lintz, Roy T.	M-40	4/27/18	Lowry, William J.	M-27	1/26/18
Litterer, Robert R.	M-25	1/19/18	Lubke, Arthur	M-36	3/30/18
Little, Fred E.	M-23	12/15/17	Lucas, Lesley H.	M-44	6/15/18
Little, Raymond J.	M-20	11/24/17	Lucas, Vernon R.	M-67	11/30/18
Littlepage, John D.	M-52a	8/17/18	Luckenbach, Harry B.	M-56	9/14/18
Livengood, William C.	L-68	11/30/18	Lunan, Frank A.	M-57	9/21/18
Livingston, Ivan D.	M-12	9/29/17	Lundell, Floyd A.	M-25	1/19/18
Lloyd, C. E.	M-2	7/21/17	Lundquist, Harry M.	M-26	1/19/18
Lloyd, Robert M.	K-72	12/21/18	Lurton, Noble	M-57	9/21/18
Lobdell, Jacob K.	M-24	12/22/17	Lusher, Frank R.	K-76	1/25/19
Lockhead, Hugh W.	M-55	9/7/18	Lyle, John M.	M-37	4/6/18
Lofland, Knox	M-50	7/27/18	Lyman, Theo. B.	M-3	7/28/17
Logan, William L.	M-29	2/9/18	Lynch, M. M.	M-9	9/8/17
Logel, Jos. Francis	M-19	11/17/17	Lynch, Victor J.	M-55	9/7/18
Logg, Charles P.	M-49	7/20/18	Maas, George J.	M-31	2/23/18
Logg, David G.	M-3	7/28/17	MacChesney, Harold A.	M-15	10/20/17
Loller, Wilbur H.	M-60	10/12/18	MacClain, Albert L.	M-43	6/8/18
Lonam, Terrance A.	M-51	8/3/18	MacDonald, Edmund L.	M-47	7/6/18
Long, C. C.	M-7	8/25/17	MacDonald, Roderick J.	M-44	6/15/18
Long, Edgar G.	M-63	11/2/18	MacDonald, M. P.	M-1	7/14/17
Longeway, Forrest H.	M-12	9/29/17	MacDonald, Royal V.	M-63	11/2/18
Looff, H. W.	M-12	9/29/17	MacFayden, Archibald G.	M-48	7/13/18
Loomis, Bertram G.	M-50	7/27/18	Macgregor, Wallace G.	M-56	9/14/18
Loomis, D. A.	M-9	9/8/17	MacInnis, Thomas C.	L-42	5/25/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
MacIver, Joseph K.	M-55	9/7/18	Maring, Wilbur R.	M-50	7/27/18
Mack, Lenard A.	M-53	8/24/18	Markey, Joseph W.	H-29	2/9/18
MacKenzie, Charles A.	M-55	9/7/18	Marriott, J. S.	H-9	9/8/17
MacKenzie, Hugh F.	H-29	2/9/18	Marsh, Byron W.	M-51	8/3/18
MacNeil, Bruce	H-31	2/23/18	Marshall, Charles A.	M-54	8/31/18
Macomber, Henry W.	H-30	2/16/18	Marshall, Dewitt T.	H-28	2/2/18
MacRae, John K.	M-51	8/3/18	Marshall, John H. Jr.	I-40	5/4/18
Macready, John A.	H-10	9/15/17	Marshall, Milton	M-54	8/31/18
MacSpadden, Chester H.	M-51	8/3/18	Marshall, Norman H.	H-32	3/2/18
Madden, Joseph E.	M-53	8/24/18	Marshall, William J.	H-32	3/2/18
Madel, Fred Jr.	H-23	12/15/17	Martel, Alfred	H-34	3/16/18
Magee, David W.	H-24	12/22/17	Martin, Carl O.	M-46	6/29/18
Mahon, William L.	H-29	2/9/18	Martin, Charles K.	K-77	2/1/19
Mahoney, James J.	M-60	10/12/18	Martin, Fred J.	M-54	8/31/18
Mahoney, Laurence E.	H-19	11/17/17	Martin, George E.	H-15	10/20/17
Main, James B.	M-33	3/9/18	Martin, Howard	H-24	12/22/17
Main, William S.	M-52	8/10/18	Martin, Morton S.	M-57	9/21/18
Maison, Harold G.	M-53	8/24/18	Martin, Pardoe	M-43	6/8/18
Makepeace, Alvin W.	M-58	9/28/18	Martin, Philip P.	H-8	9/1/17
Makin, Ray L.	H-11	9/22/17	Martin, Roland H.	M-30	2/16/18
Mallon, John B.	M-58	9/28/18	Martin, Stratton A.	M-57	7/6/18
Malloway, J. B.	H-4	8/4/17	Marx, Arthur C.	I-40	5/4/18
Malone, John F.	K-74	1/11/19	Mason, Allen A.	M-49	7/20/18
Maloney, James W.	M-55	9/7/18	Mason, Clesson E.	H-31	2/23/18
Maloney, Joseph A.	M-46	6/29/18	Mason, E. S.	H-5	8/11/17
Maloney, Thomas P.	K-71	12/14/18	Mason, Lee J.	M-67	11/30/18
Mangelsdorf, Albert J.	M-44	6/15/18	Masten, Richard L.	M-55	9/7/18
Manildi, Joseph S.	M-47	7/6/18	Mathews, George C.	H-25	1/19/18
Mann, Asa Cullis	I-41	5/11/18	Mathews, James C.	H-32	3/2/18
Mann, Laurence C.	H-10	9/15/17	Mattenlee, James H.	K-75	1/18/19
Mann, Orville T.	M-58	9/28/18	Matthews, David R.	H-34	3/16/18
Manning, Lucius	H-34	3/16/18	Matthews, Thomas K.	I-40	5/4/18
Manville, Vasco	M-59	10/5/18	Matthiessen, Frederick W.	H-31	2/23/18
Manzelman, Earl H.	H-35	3/23/18	Mau, Albert R.	M-69	11/30/18
Mapes, Gordon W.	H-25	1/19/18	Mau, Carl F.	M-60	10/12/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Maughan, Alexander R.	M-56	9/14/18	McCulloch, Howard T.	M-45	6/22/18
Maughan, Joseph H.	M-58	9/28/18	McCulloch, John M.	H-32	3/2/18
Maughan, Russell L.	H-10	9/15/17	McCullough, Gailor S.	H-15	10/20/17
Maxson, Harold F.	H-31	2/23/18	McCutchen, Perry R.	M-43	6/8/18
Maxwell, Harold J.	M-60	10/12/18	McCutchen, Vernon I.	M-51	8/3/18
Maxwell, Warren A.	H-30	2/16/18	McDermott, John W.	H-37	4/8/18
Maynard, Elsdon L.	M-50	7/27/18	McDill, Ellis L.	M-55	9/7/18
Mayott, Charles	M-43	6/8/18	McDonald, Frank W.Jr.	H-37	4/6/18
McAdam, Thomas D.	K-42	5/18/18	McDonald, James E.	H-38	4/13/18
McAllen, William D.	H-33	3/9/18	McDonald, James F.	H-30	2/16/18
McAllister, Robert W.	M-57	9/21/18	McDonald, John Q.	H-28	2/2/18
McAnear, Francis T.	M-48	7/13/18	McDonough, Harry L.	H-20	11/24/17
McBride, J. A.	H-6	8/18/17	McDougall, Harry O.	H-10	9/15/17
McBride, William W.	H-29	2/9 /18	McDowell, Alfred A.	H-38	4/13/18
McCabe, Alfred S.	H-19	11/17/17	McClory, J. W.	M-5	8/11/17
McCabe, Edward E.	M-53	8/24/18	McEwan, William C.	M-54	8/31/18
McCabe, Roscoe,E.	H-33	3/9/18	McFarland, James E.	M-51	8/3/18
McCaddam, Glen J.	I-40	5/4/18	McGann, William M.	M-54	8/31/18
McCaleb, Van Dyne	K-77	2/1/19	McGiffin, Francis R.	H-23	12/15/17
McCartney, Charles E.	H-25	1/19/18	McGill, R. E.	H-2	7/21/17
McGaughey, Harold	H-37	4/6/18	McGlinchey, Eugene	H-36	3/30/18
McCleery, Harry	M-45	6/22/18	McGorray, William E.	M-50	7/27/18
McClellan, Hez	H-36	3/30/18	McGovern, Edward T.	H-28	2/2/18
McClelland, James	M-51	8/3/18	McGowan, Francis J.	M-67	11/30/18
McClintock, Donald M.	M-55	9/7/18	McHenry, Arthur J.	H-24	12/22/17
McClory, Harry G.	H-29	2/9/18	McHenry, George A.	H-38	4/13/18
McClung, Thomas O.	M-45	6/22/18	McHenry, Lorin H.	M-51	8/3/18
McClure, William R.	M-52a	8/17/18	McHugo, Jack R.	H-29	2/9/18
McConihe, Paul M.	H-13	10/6/17	McWilliams, Fred S.	K-77	2/1/19
McCormac, Fred B.	H-39	4/20/18	McIntyre, Earl R.	M-44	6/15/18
McCornack, Robert D.	H-40	4/27/18	McIntyre,WashingtonF.A.	M-54	8/31/18
McCrillis, Jacob W.	H-35	3/23/18	McKean, E.	M-6	8/18/17
McCrimmon, Frederick D.	M-59	10/5/18	McKee, Lewis H.	M-66	11/23/18
McCroskey, Floyd T.	M-59	10/5/18	McKenzie, Arthur B.	M-51	8/3/18
McCubbin, Eugene L.	H-11	9/22/17	McKin, Joseph L.	M-49	7/20/18
			McKinley, Melvin P.	H-28	2/2/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
McKinney, Galen H.	M-66	11/23/18	Menke, Thomas H.	H-21	12/1/17
McKinney, William H.	H-28	2/2/18	Meredith, Martin T.	H-37	4/6/18
McKinnon, Morton H.	H-41	5/11/18	Mero, Ralph L.	H-11	9/22/17
McKittrick, Roy E.	M-53	8/24/18	Merriam, Robert C.	I-41	5/11/18
McKnight, Harold M.	H-8	9/1/17	Merritt, Wendell C.	M-46	6/29/18
McKnight, James A.	H-7	8/25/17	Merwin, Ogle C.	M-44	6/15/18
McKnight, Roy A.	H-28	2/2/18	Messinger, Albert	H-27	1/26/18
McLaren, William B.	H-10	9/15/17	Metcalfe,Frederick R.	M-61	10/19/18
McLean, Alexander C.	H-23	12/15/17	Metcalfe, John T.	H-30	2/16/18
McLeod, Norman Z.	H-37	4/6/18	Metzger, Bernard L.	H-36	3/30/18
McMahon, Willian J.	L-68	11/30/18	Metzger, Hutzel	H-37	4/6/18
McMaster, Augustine F.	I-41	5/11/18	Meyer, Lester L.	H-16	10/27/17
McMicken, William E.	M-60	10/12/18	Meyer, R. E.	H-4	8/4/17
McMillan, Dan A.	M-51	8/3/18	Meyers, Ben E.	H-38	4/13/18
McMullen, Alexis B.	H-34	3/16/18	Meyers, Gordon B.	I-40	5/4/18
McMurry, George H.	M-74	12/14/18	Meyers, Marion T.	M-21	12/1/17
McMurty, Leslie B.Jr.	H-3	7/28/17	Meyers, Robert K.	M-52	8/10/18
McNaught, Roy A.	H-29	2/9/18	Micander, Norbert C.	H-36	3/30/18
McNeely, Roland J.	M-56	9/14/18	Michael, Berkeley S.	H-35	3/23/18
McPeak, Daniel	M-31	2/23/18	Michener, Alfred C.	M-59	10/5/18
McPeak, Norman B.	M-19	11/17/17	Michener, Edgar C.Jr.	M-44	6/15/18
McPherson, Andrew F.	H-26	1/19/18	Middleton, Mortimer	H-31	2/23/18
McPike, George V.	M-44	6/15/18	Mighell, Malbert J.	M-51	8/3/18
McQuestion, Leavitt M.	I-40	5/4/18	Milburn, George J.	H-30	2/16/18
McVey, Richard K.	I-40	5/4/18	Millard, Joseph H.	M-29	2/9/18
Meade, Robert W.	M-71	5/11/18	Miller, Charles W.	M-31	2/23/18
Meadow, Leslie W.	K-72	12/21/18	Miller, Clifton M.	M-52	8/10/18
Meagher, Joseph E.	H-23	12/15/17	Miller, Elmon G.	M-52	8/10/18
Mechling, Eugene	H-30	2/16/18	Miller, Ernest L.	I-41	5/11/18
Mee, Karl J.	H-36	3/30/18	Miller, George W.	H-31	2/23/18
Meier, Milo S.	M-25	1/19/18	Miller, Gerald E	M-52a	8/17/18
Melendy, Harold H.	M-47	7/6/18	Miller, Harry B.	M-32	8/2/18
Mellem, Conrad	M-52a	8/17/18	Miller, Heber C.	I-41	5/11/18
Melville, Harold F.	H-26	1/19/18	Miller, Merrill A.	M-56	9/14/18
Meng, Paul H.	K-42	5/18/18	Miller, Ned O.	M-36	3/30/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Miller, Ray N.	M-58	9/28/18	Moore, Charles R.	H-31	2/23/18
Miller, Rolfe T.	H-26	1/19/18	Moore, Eugene H.	M-61	10/19/18
Miller, Vortis O.	M-58	9/28/18	Moore, Harold A.	H-31	2/23/18
Miller, Wallace H.	M-43	6/8/18	Moore, Harold E.	H-36	3/30/18
Miller, William R.	M-51	8/3/18	Moore, Henry R.	M-46	6/29/18
Miller-Jones, Henry	L-68	11/30/18	Moore, James A.	M-67	11/30/18
Mills, Harry H.	H-28	2/2/18	Moore, James C.	M-56	9/14/18
Miner, Valentine S.	H-8	9/1/17	Moore, John S.	H-30	2/16/18
Minshall, William H. jr	M-61	10/19/18	Moore, Rollin B.	K-77	2/1/19
Minter, Hugh C.	M-53	8/24/18	Moorehead, Hobart E.	H-38	4/13/18
Mitchell, Daryl C.	M-54	8/31/18	Moores, Kenneth A.	H-34	3/16/18
Mitchell, Donald H.	H-28	2/2/18	Moreland, William H.	H-13	10/6/17
Mitchell, Earl R.	H-17	11/3/17	Moreton, Amos L.	H-29	2/9/18
Mitchell, George	H-12	9/29/17	Moretti, Louis R.	H-40	4/27/18
Mitchell, J. Robert	H-20	11/24/17	Morey, Daniel F.	M-61	10/19/18
Mitchell, Mowatt M.	H-6	8/18/17	Morgan, Claude F.	H-13	10/6/17
Mitchell, Raymond A.	H-24	12/22/17	Morgan, John A.	M-60	10/12/18
Modlish, Gus P.	H-12	9/29/17	Morgan, Miles E.	L-68	11/30/18
Moe, Bardolph F.	H-60	10/12/18	Morgan, Percy T.	M-63	11/2/18
Moffitt, Howard P.	H-39	4/20/18	Morgan, William V.	H-24	12/22/17
Mohan, Roy J.	H-30	2/16/18	Morgenstern, Edmund	L-42	5/25/18
Moir, Clarence D.	M-53	8/24/18	Morley, Bernard D.	M-46	6/29/18
Moisant, Stanley J.	H-24	12/22/17	Morley, James E.	M-44	6/15/18
Moland, George R. Jr.	M-45	6/22/18	Morris, Gladstone W.D.	M-58	9/28/18
Mollison, James A.	H-26	1/19/18	Morris, William C.	H-24	12/22/17
Molumby, Loy J.	I-40	5/4/18	Morrison, Arthur R.	L-68	11/30/18
Monger, Walter V.	H-37	4/6/18	Morrison, George H.	K-77	2/1/19
Monroe, Charles H.	H-3	7/28/17	Morrison, George R.	M-52a	8/17/18
Montagne, Alfred A.	H-24	12/22/17	Morrison, John M.	M-61	10/19/18
Montagne, Marley H.	H-25	1/12/18	Morrison, Raymond	H-39	4/20/18
Montee, Kenneth W.	K-70	12/7/18	Morrison, Walter S.	H-22	12/8/17
Montgomery, Goeffrey	H-6	8/25/17	Morrow, William M.	H-40	4/27/18
Montgomery, James E.	H-21	12/1/17	Morsch, Jesse J.	H-34	3/16/18
Montgomery, Omer W.	M-67	9/21/18	Morse, Herbert K.	M-45	6/22/18
Moore, Charles C. Jr.	H-33	3/9/18	Morse, Ralph L.	M-44	6/15/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Mortenson, Joseph L.	M-60	10/12/18	Myers, Maurice C.	H-6	8/18/17
Morton, Robert E.	M-58	9/28/18	Myers, Ralph M.	M-61	10/19/18
Moseley, Carliss C.	H-14	10/13/17	Mylar, Fred T.	M-46	6/29/18
Mosier, John T.	M-54	8/31/18	Names, Arthur A.	M-43	6/8/18
Moss, Harry D.	H-22	12/8/17	Nash, Albert M.	M-57	9/21/18
Motley, J. W.	H-12	9/29/17	Nason, Bryon G.	M-63	8/24/18
Mounce, Gordon E.	M-56	9/14/18	Nathan, Thomas C.	H-3	7/28/17
Mucke, Henry C.	H-36	3/23/18	Naumann, Arthur P.	H-30	2/16/18
Mueller, Charles P.	H-30	2/16/18	Neale, John R.	M-60	10/12/18
Mueller, Frank C.	H-37	4/6/18	Needham, Chauncey E.	K-42	5/18/18
Mueller, Louis H.	H-38	4/13/18	Neely, John E.	I-40	5/4/18
Muirhead, Brian R.	I-41	5/11/18	Neet, Lewis E.	H-41	5/11/18
Mumma, Harry J.	M-59	10/5/18	Nehl, Albert H.	M-61	10/19/18
Munchof, Theodore J.	H-32	3/2/18	Neil, William D.	M-48	7/13/18
Muneke, Harold B.	M-59	10/5/18	Neill, Ernest L.	M-46	6/29/18
Munford, Edward S.Jr.	H-23	12/15/17	Neiman, Robert E.	M-49	7/20/18
Munro, A. H.	H-2	7/21/17	Neinhauser, Ralph P.	I-40	5/4/18
Munro, George A.	M-54	8/31/18	Nelson, Arlen C.	H-27	1/26/18
Munson, Clinton G.	H-7	8/25/17	Nelson, Augustus W.	K-69	11/30/18
Murphy, Cornelius L.	M-59	10/5/18	Nelson, Bert F.	K-69	11/30/18
Murphy, Eugene L.	M-61	10/19/18	Nelson, Carlyle L.	H-10	9/15/18
Murphy, Glenn R.	M-53	8/24/18	Nelson, Emil W.	M-54	8/31/18
Murphy, Joseph A.	I-40	5/4/18	Nelson, Frank J.	H-35	3/23/18
Murphy, Linus J.	H-6	8/18/17	Nelson, Gilbert O.	M-52a	8/17/18
Murphy, Maurice H.	H-23	12/15/17	Nelson, Jean O.	H-31	2/23/18
Murphy, Sidney S.	M-49	7/20/18	Nelson, Joseph T.	M-64	11/9/18
Murray, Francis F.	K-76	1/25/19	Nelson, Paul S.	M-59	10/5/18
Murray, John D.	I-40	5/4/18	Nepple, Edward	M-61	10/19/18
Murray, John N.	H-14	10/13/17	Nestle, Joseph H.	H-31	2/23/18
Murray, Paul C.	M-57	9/21/18	Nevius, Ruliff	H-12	9/29/17
Murray, Rudolph C.	I-40	5/4/18	Newberry, Claire S.	M-49	7/20/18
Musselman, Norman B.	M-54	8/31/18	Newell, Arthur E.	H-17	11/3/17
Mustain, Samuel J.	H-6	8/18/17	Newell, James M.	H-17	11/3/17
Myers, Carl E.	H-38	4/13/18	Newlin, Harold V.	H-28	2/2/18
Myers, George O.	I-40	5/4/18	Newmack, Gustave	M-52a	8/17/18

Total to bottom of this sheet - 1961

Name	Born	Died	Name	Born	Died
Anderson, Joseph L.	1-15	10/12/16	Johnson, Marie O.	1-6	7/20/78
Bailey, C. W.	1-31	12/3/17	Kelly, Edgar B.	1-28	7/30/78
Brown, Thomas G.	2-3	12/24/17	Lewis, Ruth M.	1-29	8/12/78
Carter, Mary E.	2-4	1/2/18	Miller, Frank A.	1-30	8/15/78
Davis, Robert H.	2-5	1/5/18	Nelson, Grace P.	1-31	8/18/78
Evans, Louise M.	2-6	1/8/18	Owens, Henry C.	2-1	8/21/78
Foster, Alice R.	2-7	1/11/18	Parker, Edith S.	2-2	8/24/78
Green, Walter J.	2-8	1/14/18	Quinn, Paul T.	2-3	8/27/78
Hall, Dorothy K.	2-9	1/17/18	Reed, Irene V.	2-4	8/30/78
Ingram, Edward L.	2-10	1/20/18	Smith, Clara W.	2-5	9/2/78
Jones, Harold M.	2-11	1/23/18	Taylor, Donald X.	2-6	9/5/78
King, Virginia N.	2-12	1/26/18	Upton, Ruth Y.	2-7	9/8/78
Lewis, Albert P.	2-13	1/29/18	Vance, Helen Z.	2-8	9/11/78
Moore, Edith R.	2-14	2/1/18	Walker, Oscar A.	2-9	9/14/78
Nelson, Grace T.	2-15	2/4/18	Young, Mabel B.	2-10	9/17/78
Owens, Arthur J.	2-16	2/7/18	Adams, Frank C.	2-11	9/20/78
Parker, Susan M.	2-17	2/10/18	Baker, Ruth D.	2-12	9/23/78
Quinn, Helen K.	2-18	2/13/18	Clark, Edgar E.	2-13	9/26/78
Reed, Thomas L.	2-19	2/16/18	Davis, Nancy F.	2-14	9/29/78
Smith, Virginia O.	2-20	2/19/18	Evans, Paul G.	2-15	10/2/78
Taylor, Robert A.	2-21	2/22/18	Foster, Mary H.	2-16	10/5/78
Upton, Helen C.	2-22	2/25/18	Green, Joseph I.	2-17	10/8/78
Vance, Thomas B.	2-23	2/28/18	Hall, Ruth J.	2-18	10/11/78
Walker, Grace E.	2-24	3/3/18	Ingram, Alice K.	2-19	10/14/78
Young, Frank G.	2-25	3/6/18	Jones, Louise L.	2-20	10/17/78
Allen, Dorothy P.	2-26	3/9/18	King, Robert M.	2-21	10/20/78
Brown, Edith S.	2-27	3/12/18	Lewis, Virginia R.	2-22	10/23/78
Carter, Louise B.	2-28	3/15/18	Moore, Walter C.	2-23	10/26/78
Davis, Helen M.	3-1	3/18/18	Nelson, Edith B.	2-24	10/29/78
Evans, Grace A.	3-2	3/21/18	Owens, Louise F.	2-25	11/1/78
Foster, Ruth C.	3-3	3/24/18	Parker, Grace G.	2-26	11/4/78
Green, Mary L.	3-4	3/27/18	Quinn, Helen A.	2-27	11/7/78
Hall, Virginia B.	3-5	3/30/18	Reed, Dorothy S.	2-28	11/10/78
Ingram, Ruth E.	3-6	4/2/18	Smith, Louise M.	3-1	11/13/78
Jones, Grace H.	3-7	4/5/18	Taylor, Mary R.	3-2	11/16/78
King, Helen D.	3-8	4/8/18	Upton, Virginia C.	3-3	11/19/78
Lewis, Louise K.	3-9	4/11/18	Vance, Ruth A.	3-4	11/22/78
Moore, Mary J.	3-10	4/14/18	Walker, Helen F.	3-5	11/25/78
Nelson, Ruth L.	3-11	4/17/18	Young, Grace H.	3-6	11/28/78
Owens, Edith M.	3-12	4/20/18	Allen, Louise N.	3-7	12/1/78
Parker, Virginia S.	3-13	4/23/18	Brown, Mary O.	3-8	12/4/78
Quinn, Louise T.	3-14	4/26/18	Carter, Ruth P.	3-9	12/7/78
Reed, Helen V.	3-15	4/29/18	Davis, Virginia Q.	3-10	12/10/78
Smith, Ruth W.	3-16	5/2/18	Evans, Helen R.	3-11	12/13/78
Taylor, Grace X.	3-17	5/5/18	Foster, Louise S.	3-12	12/16/78
Upton, Mary Y.	3-18	5/8/18	Green, Ruth T.	3-13	12/19/78
Vance, Virginia D.	3-19	5/11/18	Hall, Helen U.	3-14	12/22/78
Walker, Ruth Z.	3-20	5/14/18	Ingram, Grace V.	3-15	12/25/78
Young, Louise A.	3-21	5/17/18	Jones, Mary W.	3-16	12/28/78
Allen, Helen B.	3-22	5/20/18	King, Ruth X.	3-17	12/31/78
Brown, Grace C.	3-23	5/23/18	Lewis, Virginia Y.	3-18	1/3/79
Carter, Louise D.	3-24	5/26/18	Moore, Helen Z.	3-19	1/6/79
Davis, Mary E.	3-25	5/29/18	Nelson, Ruth A.	3-20	1/9/79
Evans, Ruth F.	3-26	6/1/18	Owens, Grace B.	3-21	1/12/79
Foster, Virginia G.	3-27	6/4/18	Parker, Louise C.	3-22	1/15/79
Green, Helen H.	3-28	6/7/18	Quinn, Mary D.	3-23	1/18/79
Hall, Grace I.	3-29	6/10/18	Reed, Ruth E.	3-24	1/21/79
Ingram, Louise J.	3-30	6/13/18	Smith, Virginia F.	3-25	1/24/79
Jones, Mary K.	3-31	6/16/18	Taylor, Helen G.	3-26	1/27/79
King, Ruth L.	4-1	6/19/18	Upton, Grace J.	3-27	1/30/79
Lewis, Virginia M.	4-2	6/22/18	Vance, Louise K.	3-28	2/2/79
Moore, Helen N.	4-3	6/25/18	Walker, Mary L.	3-29	2/5/79
Nelson, Ruth O.	4-4	6/28/18	Young, Ruth M.	3-30	2/8/79
Owens, Grace P.	4-5	7/1/18	Allen, Virginia N.	3-31	2/11/79
Parker, Louise Q.	4-6	7/4/18	Brown, Helen O.	4-1	2/14/79
Quinn, Mary R.	4-7	7/7/18	Carter, Ruth P.	4-2	2/17/79
Reed, Ruth S.	4-8	7/10/18	Davis, Virginia Q.	4-3	2/20/79
Smith, Virginia T.	4-9	7/13/18	Evans, Helen R.	4-4	2/23/79
Taylor, Helen U.	4-10	7/16/18	Foster, Louise S.	4-5	2/26/79
Upton, Grace V.	4-11	7/19/18	Green, Ruth T.	4-6	3/1/79
Vance, Louise W.	4-12	7/22/18	Hall, Helen U.	4-7	3/4/79
Walker, Mary X.	4-13	7/25/18	Ingram, Grace V.	4-8	3/7/79
Young, Ruth Y.	4-14	7/28/18	Jones, Mary W.	4-9	3/10/79
Allen, Virginia Z.	4-15	7/31/18	King, Ruth X.	4-10	3/13/79
Brown, Helen A.	4-16	8/3/18	Lewis, Virginia Y.	4-11	3/16/79
Carter, Ruth B.	4-17	8/6/18	Moore, Helen Z.	4-12	3/19/79
Davis, Virginia C.	4-18	8/9/18	Nelson, Ruth A.	4-13	3/22/79
Evans, Helen D.	4-19	8/12/18	Owens, Grace B.	4-14	3/25/79
Foster, Louise E.	4-20	8/15/18	Parker, Louise C.	4-15	3/28/79
Green, Ruth F.	4-21	8/18/18	Quinn, Mary D.	4-16	3/31/79
Hall, Helen G.	4-22	8/21/18	Reed, Ruth E.	4-17	4/3/79
Ingram, Grace H.	4-23	8/24/18	Smith, Virginia F.	4-18	4/6/79
Jones, Mary I.	4-24	8/27/18	Taylor, Helen G.	4-19	4/9/79
King, Ruth J.	4-25	8/30/18	Upton, Grace J.	4-20	4/12/79
Lewis, Virginia K.	4-26	9/2/18	Vance, Louise K.	4-21	4/15/79
Moore, Helen L.	4-27	9/5/18	Walker, Mary L.	4-22	4/18/79
Nelson, Ruth M.	4-28	9/8/18	Young, Ruth M.	4-23	4/21/79
Owens, Grace N.	4-29	9/11/18	Allen, Virginia N.	4-24	4/24/79
Parker, Louise O.	4-30	9/14/18	Brown, Helen O.	4-25	4/27/79
Quinn, Mary P.	5-1	9/17/18	Carter, Ruth P.	4-26	4/30/79
Reed, Ruth Q.	5-2	9/20/18	Davis, Virginia Q.	4-27	5/3/79
Smith, Virginia R.	5-3	9/23/18	Evans, Helen R.	4-28	5/6/79
Taylor, Helen S.	5-4	9/26/18	Foster, Louise S.	4-29	5/9/79
Upton, Grace T.	5-5	9/29/18	Green, Ruth T.	4-30	5/12/79
Vance, Louise U.	5-6	10/2/18	Hall, Helen U.	5-1	5/15/79
Walker, Mary V.	5-7	10/5/18	Ingram, Grace V.	5-2	5/18/79
Young, Ruth W.	5-8	10/8/18	Jones, Mary W.	5-3	5/21/79
Allen, Virginia X.	5-9	10/11/18	King, Ruth X.	5-4	5/24/79
Brown, Helen Y.	5-10	10/14/18	Lewis, Virginia Y.	5-5	5/27/79
Carter, Ruth Z.	5-11	10/17/18	Moore, Helen Z.	5-6	5/30/79
Davis, Virginia A.	5-12	10/20/18	Nelson, Ruth A.	5-7	6/2/79
Evans, Helen B.	5-13	10/23/18	Owens, Grace B.	5-8	6/5/79
Foster, Louise C.	5-14	10/26/18	Parker, Louise C.	5-9	6/8/79
Green, Ruth D.	5-15	10/29/18	Quinn, Mary D.	5-10	6/11/79
Hall, Helen E.	5-16	11/1/18	Reed, Ruth E.	5-11	6/14/79
Ingram, Grace F.	5-17	11/4/18	Smith, Virginia F.	5-12	6/17/79
Jones, Mary G.	5-18	11/7/18	Taylor, Helen G.	5-13	6/20/79
King, Ruth H.	5-19	11/10/18	Upton, Grace J.	5-14	6/23/79
Lewis, Virginia I.	5-20	11/13/18	Vance, Louise K.	5-15	6/26/79
Moore, Helen J.	5-21	11/16/18	Walker, Mary L.	5-16	6/29/79
Nelson, Ruth K.	5-22	11/19/18	Young, Ruth M.	5-17	7/2/79
Owens, Grace L.	5-23	11/22/18	Allen, Virginia N.	5-18	7/5/79
Parker, Louise M.	5-24	11/25/18	Brown, Helen O.	5-19	7/8/79
Quinn, Mary N.	5-25	11/28/18	Carter, Ruth P.	5-20	7/11/79
Reed, Ruth O.	5-26	12/1/18	Davis, Virginia Q.	5-21	7/14/79
Smith, Virginia P.	5-27	12/4/18	Evans, Helen R.	5-22	7/17/79
Taylor, Helen Q.	5-28	12/7/18	Foster, Louise S.	5-23	7/20/79
Upton, Grace R.	5-29	12/10/18	Green, Ruth T.	5-24	7/23/79
Vance, Louise S.	5-30	12/13/18	Hall, Helen U.	5-25	7/26/79
Walker, Mary T.	5-31	12/16/18	Ingram, Grace V.	5-26	7/29/79
Young, Ruth U.	6-1	12/19/18	Jones, Mary W.	5-27	8/1/79
Allen, Virginia V.	6-2	12/22/18	King, Ruth X.	5-28	8/4/79
Brown, Helen W.	6-3	12/25/18	Lewis, Virginia Y.	5-29	8/7/79
Carter, Ruth X.	6-4	12/28/18	Moore, Helen Z.	5-30	8/10/79
Davis, Virginia Y.	6-5	12/31/18	Nelson, Ruth A.	5-31	8/13/79
Evans, Helen Z.	6-6	1/3/19	Owens, Grace B.	6-1	8/16/79
Foster, Louise A.	6-7	1/6/19	Parker, Louise C.	6-2	8/19/79
Green, Ruth B.	6-8	1/9/19	Quinn, Mary D.	6-3	8/22/79
Hall, Helen C.	6-9	1/12/19	Reed, Ruth E.	6-4	8/25/79
Ingram, Grace D.	6-10	1/15/19	Smith, Virginia F.	6-5	8/28/79
Jones, Mary E.	6-11	1/18/19	Taylor, Helen G.	6-6	8/31/79
King, Ruth F.	6-12	1/21/19	Upton, Grace J.	6-7	9/3/79
Lewis, Virginia G.	6-13	1/24/19	Vance, Louise K.	6-8	9/6/79
Moore, Helen H.	6-14	1/27/19	Walker, Mary L.	6-9	9/9/79
Nelson, Ruth I.	6-15	1/30/19	Young, Ruth M.	6-10	9/12/79
Owens, Grace J.	6-16	2/2/19	Allen, Virginia N.	6-11	9/15/79
Parker, Louise K.	6-17	2/5/19	Brown, Helen O.	6-12	9/18/79
Quinn, Mary L.	6-18	2/8/19	Carter, Ruth P.	6-13	9/21/79
Reed, Ruth M.	6-19	2/11/19	Davis, Virginia Q.	6-14	9/24/79
Smith, Virginia N.	6-20	2/14/19	Evans, Helen R.	6-15	9/27/79
Taylor, Helen O.	6-21	2/17/19	Foster, Louise S.	6-16	9/30/79
Upton, Grace P.	6-22	2/20/19	Green, Ruth T.	6-17	10/3/79
Vance, Louise Q.	6-23	2/23/19	Hall, Helen U.	6-18	10/6/79
Walker, Mary R.	6-24	2/26/19	Ingram, Grace V.	6-19	10/9/79
Young, Ruth S.	6-25	3/1/19	Jones, Mary W.	6-20	10/12/79
Allen, Virginia T.	6-26	3/4/19	King, Ruth X.	6-21	10/15/79
Brown, Helen U.	6-27	3/7/19	Lewis, Virginia Y.	6-22	10/18/79
Carter, Ruth V.	6-28	3/10/19	Moore, Helen Z.	6-23	10/21/79
Davis, Virginia W.	6-29	3/13/19	Nelson, Ruth A.	6-24	10/24/79
Evans, Helen X.	6-30	3/16/19	Owens, Grace B.	6-25	10/27/79
Foster, Louise Y.	7-1	3/19/19	Parker, Louise C.	6-26	10/30/79
Green, Ruth Z.	7-2	3/22/19	Quinn, Mary D.	6-27	11/2/79
Hall, Helen A.	7-3	3/25/19	Reed, Ruth E.	6-28	11/5/79
Ingram, Grace B.	7-4	3/28/19	Smith, Virginia F.	6-29	11/8/79
Jones, Mary C.	7-5	3/31/19	Taylor, Helen G.	6-30	11/11/79
King, Ruth D.	7-6	4/3/19	Upton, Grace J.	7-1	11/14/79
Lewis, Virginia E.	7-7	4/6/19	Vance, Louise K.	7-2	11/17/79
Moore, Helen F.	7-8	4/9/19	Walker, Mary L.	7-3	11/20/79
Nelson, Ruth G.	7-9	4/12/19	Young, Ruth M.	7-4	11/23/79
Owens, Grace H.	7-10	4/15/19	Allen, Virginia N.	7-5	11/26/79
Parker, Louise I.	7-11	4/18/19	Brown, Helen O.	7-6	11/29/79
Quinn, Mary J.	7-12	4/21/19	Carter, Ruth P.	7-7	12/2/79
Reed, Ruth K.	7-13	4/24/19	Davis, Virginia Q.	7-8	12/5/79
Smith, Virginia L.	7-14	4/27/19	Evans, Helen R.	7-9	12/8/79
Taylor, Helen M.	7-15	4/30/19	Foster, Louise S.	7-10	12/11/79
Upton, Grace N.	7-16	5/3/19	Green, Ruth T.	7-11	12/14/79
Vance, Louise O.	7-17	5/6/19	Hall, Helen U.	7-12	12/17/79
Walker, Mary P.	7-18	5/9/19	Ingram, Grace V.	7-13	12/20/79
Young, Ruth Q.	7-19	5/12/19	Jones, Mary W.	7-14	12/23/79
Allen, Virginia R.	7-20	5/15/19	King, Ruth X.	7-15	12/26/79
Brown, Helen S.	7-21	5/18/19	Lewis, Virginia Y.	7-16	12/29/79
Carter, Ruth T.	7-22	5/21/19	Moore, Helen Z.	7-17	1/1/80
Davis, Virginia U.	7-23	5/24/19	Nelson, Ruth A.	7-18	1/4/80
Evans, Helen V.	7-24	5/27/19	Owens, Grace B.	7-19	1/7/80
Foster, Louise W.	7-25	5/30/19	Parker, Louise C.	7-20	1/10/80
Green, Ruth X.	7-26	6/2/19	Quinn, Mary D.	7-21	1/13/80
Hall, Helen Y.	7-27	6/5/19	Reed, Ruth E.	7-22	1/16/80
Ingram, Grace Z.	7-28	6/8/19	Smith, Virginia F.	7-23	1/19/80
Jones, Mary A.	7-29	6/11/19	Taylor, Helen G.	7-24	1/22/80
King, Ruth B.	7-30	6/14/19	Upton, Grace J.	7-25	1/25/80
Lewis, Virginia C.	7-31	6/17/19	Vance, Louise K.	7-26	1/28/80
Moore, Helen D.	8-1	6/20/19	Walker, Mary L.	7-27	1/31/80
Nelson, Ruth E.	8-2	6/23/19	Young, Ruth M.	7-28	2/3/80
Owens, Grace F.	8-3	6/26/19	Allen, Virginia N.	7-29	2/6/80
Parker, Louise G.	8-4	6/29/19	Brown, Helen O.	7-30	2/9/80
Quinn, Mary H.	8-5	7/2/19	Carter, Ruth P.	7-31	2/12/80
Reed, Ruth I.	8-6	7/5/19	Davis, Virginia Q.	8-1	2/15/80
Smith, Virginia J.	8-7	7/8/19	Evans, Helen R.	8-2	2/18/80
Taylor, Helen K.	8-8	7/11/19	Foster, Louise S.	8-3	2/21/80
Upton, Grace L.	8-9	7/14/19	Green, Ruth T.	8-4	2/24/80
Vance, Louise M.	8-10	7/17/19	Hall, Helen U.	8-5	2/27/80
Walker, Mary N.	8-11	7/20/19	Ingram, Grace V.	8-6	3/1/80
Young, Ruth O.	8-12	7/23/19	Jones, Mary W.	8-7	3/4/80
Allen, Virginia P.	8-13	7/26/19	King, Ruth X.	8-8	3/7/80
Brown, Helen Q.	8-14	7/29/19	Lewis, Virginia Y.	8-9	3/10/80
Carter, Ruth R.	8-15	8/1/19	Moore, Helen Z.	8-10	3/13/80
Davis, Virginia S.	8-16	8/4/19	Nelson, Ruth A.	8-11	3/16/80
Evans, Helen T.	8-17	8/7/19	Owens, Grace B.	8-12	3/19/80
Foster, Louise U.	8-18	8/10/19	Parker, Louise C.	8-13	3/22/80
Green, Ruth V.	8-19	8/13/19	Quinn, Mary D.	8-14	3/25/80
Hall, Helen W.	8-20	8/16/19	Reed, Ruth E.	8-15	3/28/80
Ingram, Grace X.	8-21	8/19/19	Smith, Virginia F.	8-16	3/31/80
Jones, Mary Y.	8-22	8/22/19	Taylor, Helen G.	8-17	4/3/80
King, Ruth Z.	8-23	8/25/19	Upton, Grace J.	8-18	4/6/80
Lewis, Virginia A.	8-24	8/28/19	Vance, Louise K.	8-19	4/9/80
Moore, Helen B.	8-25	8/31/19	Walker, Mary L.	8-20	4/12/80
Nelson, Ruth C.	8-26	9/3/19	Young, Ruth M.	8-21	4/15/80
Owens, Grace D.	8-27	9/6/19	Allen, Virginia N.	8-22	4/18/80
Parker, Louise E.	8-28	9/9/19	Brown, Helen O.	8-23	4/21/80
Quinn, Mary F.	8-29	9/12/19	Carter, Ruth P.	8-24	4/24/80
Reed, Ruth G.	8-30	9/15/19	Davis, Virginia Q.	8-25	4/27/80
Smith, Virginia H.	8-31	9/18/19	Evans, Helen R.	8-26	4/30/80
Taylor, Helen I.	9-1	9/21/19	Foster, Louise S.	8-27	5/3/80
Upton, Grace J.	9-2	9/24/19	Green, Ruth T.	8-28	5/6/80
Vance, Louise K.	9-3	9/27/19	Hall, Helen U.	8-29	5/9/80
Walker, Mary L.	9-4	9/30/19	Ingram, Grace V.	8-30	5/12/80
Young, Ruth M.	9-5	10/3/19	Jones, Mary W.	8-31	5/15/80
Allen, Virginia N.	9-6	10/6/19	King, Ruth X.	9-1	5/18/80
Brown, Helen O.	9-7	10/9/19	Lewis, Virginia Y.	9-2	5/21/80
Carter, Ruth P.	9-8	10/12/19	Moore, Helen Z.	9-3	5/24/80
Davis, Virginia Q.	9-9	10/15/19	Nelson, Ruth A.	9-4	5/27/80
Evans, Helen R.	9-10	10/18/19	Owens, Grace B.	9-5	5/30/80
Foster, Louise S.	9-11	10/21/19	Parker, Louise C.	9-6	6/2/80
Green, Ruth T.	9-12	10/24/19	Quinn, Mary D.	9-7	6/5/80
Hall, Helen U.	9-13	10/27/19	Reed, Ruth E.	9-8	6/8/80
Ingram, Grace V.	9-14	10/30/19	Smith, Virginia F.	9-9	6/11/80
Jones, Mary W.	9-15	11/2/19	Taylor, Helen G.	9-10	6/14/80
King, Ruth X.	9-16	11/5/19	Upton, Grace J.	9-11	6/17/80
Lewis, Virginia Y.	9-17	11/8/19	Vance, Louise K.	9-12	6/20/80
Moore, Helen Z.	9-18	11/11/19	Walker, Mary L.	9-13	6/23/80
Nelson, Ruth A.	9-19	11/14/19	Young, Ruth M.	9-14	6/26/80
Owens, Grace B.	9-20	11/17/19	Allen, Virginia N.	9-15	6/29/80
Parker, Louise C.	9-21	11/20/19	Brown, Helen O.	9-16	7/2/80
Quinn, Mary D.	9-22	11/23/19	Carter, Ruth P.	9-17	7/5/80
Reed, Ruth E.	9-23	11/26/19	Davis, Virginia Q.	9-18	7/8/80
Smith, Virginia F.	9-24	11/29/19	Evans, Helen R.	9-19	7/11/80
Taylor, Helen G.	9-25	12/2/19	Foster, Louise S.	9-20	7/14/80
Upton, Grace J.	9-26	12/5/19	Green, Ruth T.	9-21	7/17/80
Vance, Louise K.	9-27	12/8/19	Hall, Helen U.	9-22	7/20/80
Walker, Mary L.	9-28	12/11/19	Ingram, Grace V.	9-23	7/23/80
Young, Ruth M.	9-29	12/14/19	Jones, Mary W.	9-24	7/26/80
Allen, Virginia N.	9-30	12/17/19	King, Ruth X.	9-25	7/29/80
Brown, Helen O.	10-1	12/20/19	Lewis, Virginia Y.	9-26	8/1/80
Carter, Ruth P.	10-2	12/23/19	Moore, Helen Z.	9-27	8/4/80
Davis, Virginia Q.	10-3	12/26/19	Nelson, Ruth A.	9-28	8/7/80
Evans, Helen R.	10-4	12/29/19	Owens, Grace B.	9-29	8/10/80
Foster, Louise S.	10-5	1/1/20	Parker, Louise C.	9-30	8/13/80
Green, Ruth T.	10-6	1/4/20	Quinn, Mary D.	10-1	8/16/80
Hall, Helen U.	10-7	1/7/20	Reed, Ruth E.	10-2	8/19/80
Ingram, Grace V.	10-8	1/10/20	Smith, Virginia F.	10-3	8/22/80
Jones, Mary W.	10-9	1/13/20	Taylor, Helen G.	10-4	8/25/80
King, Ruth X.	10-10	1/16/20	Upton, Grace J.	10-5	8/28/80
Lewis, Virginia Y.	10-11	1/19/20	Vance, Louise K.	10-6	8/31/80
Moore, Helen Z.	10-12	1/22/20	Walker, Mary L.	10-7	9/3/80
Nelson, Ruth A.	10-13	1/25/20	Young, Ruth M.	10-8	9/6/80
Owens, Grace B.	10-14	1/28/20	Allen, Virginia N.	10-9	9/9/80
Parker, Louise C.	10-15	1/31/20	Brown, Helen O.	10-10	9/12/80
Quinn, Mary D.	10-16	2/3/20	Carter, Ruth P.	10-11	9/15/80
Reed, Ruth E.	10-17	2/6/20	Davis, Virginia Q.	10-12	9/18/80
Smith, Virginia F.	10-18	2/9/20	Evans, Helen R.	10-13	9/21/80
Taylor, Helen G.	10-19	2/12/20	Foster, Louise S.	10-14	9/24/80
Upton, Grace J.	10-20	2/15/20	Green, Ruth T.	10-15	9/27/80
Vance, Louise K.	10-21	2/18/20	Hall, Helen U.	10-16	9/30/80
Walker, Mary L.	10-22	2/21/20	Ingram, Grace V.	10-17	10/3/80
Young, Ruth M.	10-23	2/24/20	Jones, Mary W.	10-18	10/6/80
Allen, Virginia N.	10-24	2/27/20	King, Ruth X.	10-19	10/9/80
Brown, Helen O.	10-25	3/1/20	Lewis, Virginia Y.	10-20	10/12/80
Carter, Ruth P.	10-26	3/4/20	Moore, Helen Z.	10-21	10/15/80
Davis, Virginia Q.	10-27	3/7/20	Nelson, Ruth A.	10-22	10/18/80
Evans, Helen R.	10-28	3/10/20	Owens, Grace B.	10-23	10/21/80
Foster, Louise S.	10-29	3/13/20	Parker, Louise C.	10-24	10/24/80
Green, Ruth T.	10-30	3/16/20	Quinn, Mary D.	10-25	10/27/80
Hall, Helen U.	10-31	3/19/20	Reed, Ruth E.	10-26	10/30/80
Ingram, Grace V.	11-1	3/22/20	Smith, Virginia F.	10-27	11/2/80
Jones, Mary W.	11-2	3/25/20	Taylor, Helen G.	10-28	11/5/80
King, Ruth X.	11-3	3/28/20	Upton, Grace J.	10-29	11/8/80
Lewis, Virginia Y.	11-4	3/31/20	Vance, Louise K.	10-30	11/11/80
Moore, Helen Z.	11-5	4/3/20	Walker, Mary L.	10-31	11/14/80
Nelson, Ruth A.	11-6	4/6/20	Young, Ruth M.	11-1	11/17/80
Owens, Grace B.	11-7	4/9/20	Allen, Virginia N.	11-2	11/20/80
Parker, Louise C.	11-8	4/12/20	Brown, Helen O.	11-3	11/23/80
Quinn, Mary D.	11-9	4/15/20	Carter, Ruth P.	11-4	11/26/80
Reed, Ruth E.	11-10	4/18/20	Davis, Virginia Q.	11-5	11/29/80
Smith, Virginia F.	11-11	4/21/20	Evans, Helen R.	11-6	12/2/80
Taylor, Helen G.	11-12	4/24/20	Foster, Louise S.	11-7	12/5/80
Upton, Grace J.	11-13	4/27/20	Green, Ruth T.	11-8	12/8/80
Vance, Louise K.	11-14	4/30/20	Hall, Helen U.	11-9	12/11/80
Walker, Mary L.	11-15	5/3/20	Ingram, Grace V.	11-10	12/14/80
Young, Ruth M.	11-16	5/6/20	Jones, Mary W.	11-11	12/17/80
Allen, Virginia N.	11-17	5/9/20	King, Ruth X.	11-12	12/20/80
Brown, Helen O.	11-18	5/12/20	Lewis, Virginia Y.	11-13	12/23/80
Carter, Ruth P.	11-19	5/15/20	Moore, Helen Z.	11-14	12/26/80
Davis, Virginia Q.	11-20	5/18/20	Nelson, Ruth A.	11-15	12/29/80
Evans, Helen R.	11-21	5/21/20	Owens, Grace B.	11-16	1/1/81
Foster, Louise S.	11-22	5/24/20	Parker, Louise C.	11-17	1/4/81
Green, Ruth T.	11-23	5/27/20	Quinn, Mary D.	11-18	1/7/81
Hall, Helen U.	11-24	5/30/20	Reed, Ruth E.	11-19	1/10/81
Ingram, Grace V.	11-25	6/2/20	Smith, Virginia F.	11-20	1/13/81
Jones, Mary W.	11-26	6/5/20	Taylor, Helen G.	11-21	1/16/81
King, Ruth X.	11-27	6/8/20	Upton, Grace J.	11-22	1/19/81
Lewis, Virginia Y.	11-28	6/11/20	Vance, Louise K.	11-23	1/22/81
Moore, Helen Z.	11-29	6/14/20	Walker, Mary L.	11-24	1/25/81
Nelson, Ruth A.	11-30	6/17/20	Young, Ruth M.	11-25	1/28/81
Owens, Grace B.	12-1	6/20/20	Allen, Virginia N.	11-26	1/31/81
Parker, Louise C.	12-2	6/23/20	Brown, Helen O.	11-27	2/3/81
Quinn, Mary D.	12-3	6/26/20	Carter, Ruth P.	11-28	2/6/81
Reed, Ruth E.	12-4	6/29/20	Davis, Virginia Q.	11-29	2/9/81
Smith, Virginia F.	12-5	7/2/20	Evans, Helen R.	11-30	2/12/81
Taylor, Helen G.	12-6	7/5/20	Foster, Louise S.	12-1	2/15/81
Upton, Grace J.	12-7	7/8/20	Green, Ruth T.	12-2	2/18/81
Vance, Louise K.	12-8	7/11/20	Hall, Helen U.	12-3	2/21/81
Walker, Mary L.	12-9	7/14/20	Ingram, Grace V.	12-4	2/24/81
Young, Ruth M.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Newman, Ira W.	M-59	10/5/18	Ochsenbein, Orlo F.	M-54	8/31/18
Newton, Raymond A.	K-70	12/7/18	O'Connell, Robert E.	H-27	1/26/18
Nichols, E. E.	H-5	8/11/17	O'Connor, George R.	M-58	9/28/18
Nichols, Luther A.	H-26	1/19/18	Odell, Donald A.	M-60	10/12/18
Nichols, Samuel J.	M-57	9/21/18	Oden, James W.	M-59	10/5/18
Nielsen, Alvin J.	H-33	3/9/18	O'Dowda, John S.	M-18	11/10/17
Nielsen, Andrew J.	H-39	4/20/18	O'Handley, John M.	M-54	8/31/18
Nielsen, Emil H.	M-52	8/10/18	O'Hanley, Myron E.	H-34	3/16/18
Nigh, Gordon K.	H-28	2/2/18	Olds, Fred H.	M-45	8/22/18
Nilson, Harry B.	M-43	6/8/18	Olds, Harvey R.	H-26	1/19/18
Nilsson, Arthur N.	M-53	8/24/18	O'Leary, Charles	M-54	8/31/18
Nimmo, Sheldon H.	M-58	9/28/18	Oliver, Henry M.	M-55	9/7/18
Nims, Homer W.	H-33	3/9/18	Oliver, W. E.	H-2	7/21/17
Nissager, Fred D. M.	H-29	2/9/18	Olmstead, Paul H.	M-50	7/27/18
Noble, Edward C.	M-60	10/12/18	Olsen, Leslie J.	M-55	9/7/18
Noble, Raymond E.	K-72	12/21/18	O'Neal, William L.	M-67	11/30/18
Nolan, Albert J.	M-52	8/24/18	O'Neill, Donald B.	M-56	9/14/18
Noll, Cecil R.	M-57	9/21/18	O'Neill, Edward M.	M-53	8/24/18
Nomis, Leo G.	H-25	1/19/18	O'Neill, John F.	H-25	1/12/18
Noonan, Leo E.	K-76	1/25/19	Orand, David H.	M-29	2/9/18
Norby, Erling, S.	H-38	4/13/18	Ordway, William F.	M-24	12/22/17
Nordeen, Louis H.	M-42	6/1/18	Organ, Vernon C.	M-23	12/15/17
Nordeen, Ansel G.	H-22	12/8/17	Orme, Thomas H.	M-51	8/3/18
Nordin, Oscar	M-19	11/17/17	Ormsby, Orland	M-57	9/21/18
Noren, Carl A.	M-29	2/9/18	Orr, Alexander B.	I-41	5/11/18
Norgren, Nelson C.	H-39	4/20/18	Orr, Charles W.	M-53	8/24/18
Norris, Elmer R.	L-68	11/30/18	Orr, Dale	M-31	2/23/18
Norris, Fred P.	H-38	4/13/18	Orr, Robert L.	K-69	11/30/18
Norton, Harrison E.	H-25	1/19/18	Osen, Frank S.	M-57	9/21/18
Norton, Rolla W.	H-25	1/19/18	O'Shaughnessy, Thomas P.	M-61	10/19/18
Norton, William X.	H-3	7/28/17	O'Shea, Edward M.	H-32	3/2/18
Nowland, B. E.	H-5	8/11/17	Osterloh, William D.	M-54	8/31/18
Nunenmacher, Francis W.	H-32	3/2/18	O'Sullivan, John R.	M-53	8/24/18
Oakes, Gail C.	H-22	12/8/17	Otis, Clyde L.	M-52a	8/17/18
Oakley, John W.	H-17	11/3/17	Oviatt, Benjamin M.	M-59	10/5/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Owen, Robert W.	H-14	10/13/17	Paul, Leo C.	K-71	12/14/18
Packard, Luke D.	M-51	8/3/18	Pauly, Charles W.	H-11	9/22/17
Packard, Paul S.	K-77	2/1/19	Paustian, Franz H.	H-37	4/6/18
Packer, Joseph H.	M-57	9/21/18	Payne, Bryan W.	H-34	3/16/18
Page, Frank T.	M-67	11/30/18	Payne, Walter T.	H-30	2/16/18
Paine, Grosvenor R.	H-30	2/16/18	Peabody, Charles M.	M-54	8/31/18
Paine, Topliff O.	H-33	3/9/18	Pearse, Rubee J.	H-33	3/9/18
Pallette, Eugene W.	M-56	9/14/18	Pearson, Alexander Jr.	H-40	4/27/18
Palmer, Charles A.	M-48	7/13/18	Pearson, Clarence W.	H-37	4/6/18
Palmer, James E.	H-33	3/9/18	Pearson, Ernest E.	M-53	8/24/18
Palmer, Leon,	M-58	9/28/18	Pearson, Joseph R.Jr.	H-8	9/1/17
Palmer, Lloyd	I-41	5/11/18	Peck, Llewellyn B.	M-59	10/5/18
Pangborn, Clyde E.	M-51	8/3/18	Pelouze, Robert F.	M-66	11/23/18
Panton, John	M-46	6/29/18	Pemberthy, Paul	H-26	1/19/18
Pardy, George W.	H-21	12/1/17	Pemberton, Guilford	H-37	4/6/18
Parish, Chcaney L.	H-32	3/2/18	Penn, Leonidas	M-59	10/5/18
Parish, Hayward C.	H-23	12/15/17	Perrin, Jay C.	M-57	9/21/18
Park, Bartholow	H-39	4/20/18	Perry, William L.	H-24	12/22/17
Park, Lawrence E.	M-66	11/23/18	Persons, Stenley M.	H-36	3/30/18
Parker, Ralph C.	M-52a	8/17/18	Peters, Rudolph C.	H-25	1/12/18
Parker, Robert M.	H-16	10/27/17	Peters, Sidney V.W.	H-22	12/8/17
Parkhill, Homer L.	M-46	6/29/18	Peters, William H.	M-58	9/28/18
Parkin, Walter E.	H-3	7/28/17	Peterson, Ernest J.	H-20	11/24/17
Parkinson, Donald B.	M-56	9/14/18	Peterson, Frank L.	H-36	3/30/18
Parkinson, Oscar C.	M-45	6/22/18	Peterson, Frederick R.	H-31	2/23/18
Parmelee, Charles R.	H-28	2/2/18	Peterson, George S.	H-3	7/28/17
Parmenter, Marley H.	H-39	4/20/18	Peterson, Tenny C.	H-22	12/8/17
Parrott, E. A.	H-1	7/14/17	Peterson, Vance C.	H-23	12/15/17
Parry, Chauncey G.	M-66	11/23/18	Petrilli, John M.	H-22	12/8/17
Patten, Carl H.	K-76	1/25/19	Peugh, Wilbur D.	M-53	8/24/18
Patterson, Robert D.	M-59	10/5/18	Peyton, Russell P.	M-57	9/21/18
Patterson, Walter C.	M-58	9/28/18	Pheatt, Merrill N.	H-32	3/2/18
Pattiani, Alois W.Jr.	H-25	1/12/18	Phelps, Edward G.	H-39	4/20/18
Paul, Albert H.	M-60	10/12/18	Phelps, Horace F.	M-54	8/31/18
Paul, Clarence L.	M-44	6/15/18	Philbrook, Jacob B.	H-24	12/22/17

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Phillips, Harry A.	M-67	11/30/18	Powell, Orlo A.	H-37	4/6/18
Phillips, Lyman L.	H-28	2/2/18	Powell, Robert W.	H-17	11/3/17
Phillips, Walter K.	M-66	11/23/18	Powelson, Karl D.	M-43	6/8/18
Phillipps, Robert D.	M-50	7/27/18	Power, Richard G.	M-51	8/3/18
Pieper, Howard K.	M-59	10/5/18	Powers, Joshua B.	M-57	9/21/18
Pier, Winthrop	M-52a	8/17/18	Pratt, Donald L.	K-76	1/25/19
Pierce, Lew W.	K-72	12/21/18	Pratt, Eric T.	H-35	3/23/18
Pierce, Willis F.	M-44	6/15/18	Preble, Boyd	M-56	9/14/18
Pike, Glenn M.	H-3	7/28/17	Preble, Edward W.	M-61	10/19/18
Pilkington, Fred W.	H-28	2/2/18	Preisker, William H.	H-38	4/13/18
Pillsbury, William G.	H-38	4/13/18	Prentice, George G. Jr.	M-51	8/3/18
Pitts, James H.	M-57	9/21/18	Presby, Clinton C.	M-59	10/5/18
Pitts, Raymond B.	M-45	6/22/18	Preston, C. I.	H-2	7/21/17
Pixler, Ernest C.	M-60	10/12/18	Price, Alexander J.	M-60	10/12/18
Pixley, James L.	H-39	4/20/18	Price, Clarence M.	M-56	9/14/18
Ploeger, Frank C.	K-69	11/30/18	Prince, Rudolph A.	K-77	2/1/19
Plumb, Marll J.	H-25	1/12/18	Pringle, Edward O.	M-57	9/21/18
Plush, Lewis	H-12	9/29/17	Prior, Roger W.	H-19	11/17/17
Polhemus, George S.	H-25	1/12/18	Pritchard, Fred L.Jr.	H-30	2/16/18
Polk, Claude A.	H-31	2/23/18	Proctor, Bernhard A.	K-77	2/1/19
Pollock, Arthur	M-44	6/15/18	Prosser, Frank H.	H-30	2/16/18
Polson, Harold J.	H-28	2/2/18	Prosser, Harvey W.	H-8	9/1/17
Poole, Charles F.	M-56	9/14/18	Provoost, Francis L.	M-52	8/10/18
Pope, H. M.	H-1	7/14/17	Puckett, Thomas L.	H-39	4/20/18
Poppic, Arnold	H-28	2/2/18	Pugh, Harvey M.	H-38	4/13/18
Porter, John E.	H-40	4/27/18	Pugh, Richard O.	H-34	3/16/18
Post, John H.	H-32	3/2/18	Pullis, Edison H.	L-68	11/30/18
Post, Leo	H-4	8/4/17	Purdy, Harold S.	M-45	6/22/18
Post, Speed L.	H-23	12/15/17	Putman, Russell L.	H-28	2/2/18
Potter, Charles M.	H-23	12/15/17	Putzel, Myron G.	M-44	6/15/18
Potter, Howard E.	M-43	6/8/18	Pyke, Charles L.	H-27	1/26/18
Potter, N. W.	H-5	8/11/17	Pyper, Allan G.	K-74	1/11/19
Poulin, John A.	H-27	1/26/18	Quail, John L.	M-52	8/10/18
Poulson, Forrest C.	H-31	2/23/18	Quarnberg, Paul R.	H-37	4/6/18
Powell, Charles W.	H-5	8/11/17	Quaw, Clayton D.	H-39	4/20/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Queen, Harold E.	H-31	2/23/18	Neeves, Dache M.	H-3	7/28/17
Quigley, John V.	H-40	4/27/18	Regan, Francis M.	H-37	4/6/18
Radford, William A.Jr.	H-36	3/30/18	Regan, Paul T.	M-48	7/13/18
Rady, William J.	H-38	4/13/18	Rehlmeyer, A. G.	H-6	8/18/17
Ragatz, Edward G.	H-35	3/23/18	Reichhold, Herbert A.	M-60	10/12/18
Rairden, David L.	H-12	9/29/17	Reilly, George C.	H-19	11/17/17
Raisner, Wilbur W.	M-57	9/21/18	Reis, John B.	H-22	12/8/17
Raithel, Andrew G.	M-48	7/13/18	Reisz, George S.	H-26	1/19/18
Raley, Edward W.	H-3	7/28/17	Remelin, Eldred L.	K-70	12/7/18
Ramsey, Alfred P.	K-77	2/1/19	Renard, Gustave A.	M-45	6/22/18
Randall, Rex R.	H-38	4/13/18	Rensch, Joseph R.	M-50	7/27/18
Randall, Hugh P.	H-25	1/12/18	Rentfrow, Frank M.	H-29	2/9/18
Rankin, C. A.	H-5	8/11/17	Reynard, Lester A.	H-27	1/26/18
Rankin, Charles D.	K-69	11/30/18	Reynolds, Arnold R.	H-38	4/13/18
Rankin, Ernest S.	M-67	11/30/18	Reynolds, Burton R.	M-44	6/15/18
Ratcliffe, Kent E.	H-34	3/16/18	Reynolds, Clark C.	H-29	2/9/18
Rauh, Joseph R.	M-65	11/16/18	Reynolds, Clyde G.	M-55	9/7/18
Read, Edwin M.	H-33	3/9/18	Reynolds, Hugh M.	H-13	10/6/17
Read, James E.	H-30	2/16/18	Reynolds, Jack W.	M-64	11/9/18
Ream, George D.	H-9	9/8/17	Reynolds, Samuel	M-53	8/24/18
Reardon, John H.	M-59	10/5/18	Reynolds, Thomas E.	H-37	4/6/18
Reavil, Richey B.	M-47	7/6/18	Rhoades, Otto V.	H-38	4/13/18
Reavis, Carlos L.	H-30	2/16/18	Rhodes, Arthur P.	M-54	8/31/18
Rechsteiner, Victor M.	H-34	3/16/18	Rhodes, Willard F.	H-14	10/13/17
Record, Fred A.	I-40	5/4/18	Rice, Franklin D.	H-31	2/23/18
Reed, Edward H.	M-59	10/5/18	Rice, George E.	H-36	3/30/18
Reed, Emmet M.	M-46	6/29/18	Rice, Malcolm S.	M-55	9/7/18
Reed, Fred C.	M-55	9/7/18	Rice, Verner J.	M-58	9/28/18
Reed, Glenn A.	M-58	9/28/18	Rich, Dan O.	H-26	1/19/18
Reed, Harold A.	M-43	6/8/18	Rich, James L.	M-48	7/13/18
Reed, Joseph	M-59	10/5/18	Richey, Robert G.	I-41	5/11/18
Reed, Roy E.	K-77	2/1/19	Richards, Everett P.	M-67	11/30/18
Reed, Russell	M-58	9/28/18	Richardson, Asahel D.	M-54	8/31/18
Reed, T. R.	H-4	8/4/17	Richardson, Carleton	M-45	6/22/18
Reese, Lewellyn J.	H-23	12/15/17	Richardson, Elmer C.	H-30	2/16/18

Total to bottom of this sheet - 2241

Graduates - School of Military Aeronautics - Engineering.

Appendix ____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Richardson, William H.	M-54	8/31/18	Robinson, Frederick A.	H-33	3/9/18
Richmond, Harold J.	K-69	11/30/18	Robinson, George S.	M-52	8/10/18
Richmond, Roy D.	K-70	12/7/18	Robinson, John H.	H-20	11/24/17
Rickard, C. H.	H-5	8/11/17	Robinson, Kenneth W.	K-77	2/1/19
Riddick, Rolland C.	H-27	1/26/18	Robinson, Leroy H.	M-59	10/5/18
Ridenour, Carlyle H.	H-38	4/13/18	Robinson, Percy M.	M-54	8/31/18
Riggs, Robert M.	H-23	12/15/17	Robinson, Sam J.	M-59	10/5/18
Riker, Eugene A.	M-66	11/23/18	Robley, Richard R.	M-54	8/31/18
Ringer, Albert R.	H-29	2/9/18	Roche, John C.	H-15	10/20/17
Riordan, Emmet F.	H-29	2/9/18	Roddan, Donald B.	M-50	7/27/18
Ripperger, Clement M.	M-48	7/13/18	Roedel, Andrew E.	H-24	12/22/17
Ritchey, William M.	M-51	6/3/18	Rogers, Edward B.	H-28	2/2/18
Rivera, Reynaldo J.	H-25	1/12/18	Rogers, Emery H.	H-21	12/1/17
Rivers, Harold B.	H-23	12/15/17	Rogers, James B.	H-3	7/28/17
Roach, Howard	H-36	3/30/18	Rogers, Thomas B.	M-56	9/14/18
Roadman, Roy C.	M-63	11/2/18	Rogers, Vertus W.	H-37	4/6/18
Robbins, Ralph B.	H-30	2/16/18	Roll, George H.	M-54	8/31/18
Robbins, Sanis E.	M-59	10/5/18	Rollins, Frank L.	K-74	1/11/19
Robbins, Urban G.	H-11	9/22/17	Rollins, M. E.	H-4	8/4/17
Robbins, W. D.	H-4	8/4/17	Romans, Edgar D.	H-30	2/16/18
Robesky, Robley M.	M-44	6/15/18	Ronbough, Miles D.	H-38	4/13/18
Roberson, George O.	H-41	5/11/18	Ronne, Edwin M.	H-10	9/15/17
Roberts, Charles P.	M-52	8/10/18	Rooney, Francis L.	M-49	7/20/18
Roberts, David B.	M-57	9/21/18	Roos, Camil N.	H-23	12/15/17
Roberts, EdwinA.	H-29	2/9/18	Root, Homer B.	H-33	3/9/18
Roberts, George D.	H-39	4/20/18	Rose, Charles D.	M-54	8/31/18
Roberts, George W.	K-69	11/30/18	Rose, Glenn W.	H-30	2/16/18
Roberts, Gordan A.	M-52	8/10/18	Rose, Joseph W.	H-26	1/19/18
Roberts, Philip W.	M-59	10/5/18	Rosenberg, Walter	M-57	9/21/18
Roberts, Ray C.	H-30	2/16/18	Ross, Howard S.	M-61	10/19/18
Roberts, William J.	H-17	11/3/17	Ross, Norman De M.	H-31	2/23/18
Robertson, Arthur	H-19	11/17/17	Ross, Orrin E.	M-47	7/6/18
Robertson, Fitch	M-58	9/28/18	Rossen, Raymond C.	M-55	9/7/18
Robins, Edward J.	H-40	4/27/18	Rossiter, Ednor M.	H-33	3/9/18
Robinson, Edward T.	M-54	8/31/18	Roth, Archie F.	H-18	11/10/17

Total to bottom of this sheet - 2311

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Rough, Howard F.	H-24	12/22/17	Sandvigen, Gilbert S.	H-30	2/16/18
Roullet, J. P.	H-1	7/14/17	Sansom, John M.	M-59	10/5/18
Rowan, Lynn L.	M-58	9/28/18	Sargent, Bradley E.	H-39	4/20/18
Rowe, Charles S.	H-37	4/6/18	Sarthou, Alexander E.	H-27	1/26/18
Rowe, Edward J.	M-67	11/30/18	Satterberg, Elmer J.	M-57	9/21/18
Rowe, Harold D.	H-30	2/16/18	Saunders, Edward F.	M-60	10/12/18
*Rowe, Harry J.	H-3	7/28/17	Saunders, John J.	H-31	2/23/18
Rowe, Harvey J.	L-68	11/30/18	Saunders, John M.	H-34	3/16/18
Rowe, Hiram H.	H-32	3/2/18	Saunders, Minnett	H-7	8/25/17
Roy, Arthur C.	M-53	8/24/18	Saunders, Thomas J.	M-57	9/21/18
Royce, Walker W.	H-23	12/15/17	Savage, Clair R.	H-29	2/9/18
Royle, William M.	H-4	8/4/17	Sayre, Harold W.	M-61	10/19/18
Rubin, Myer C.	H-39	4/20/18	Sayre, Robert H.	H-39	4/20/18
Ruby, Orville W.	M-44	6/15/18	Scammell, Edward J.	H-24	12/22/17
Rude, Arthur H.	M-55	9/7/18	Scantlin, Thomas E.	H-18	11/10/17
Rue, Lars	H-30	2/16/18	Scarlett, Art L.	M-54	8/31/18
Ruegg, Joseph A.	H-36	3/30/18	Schaetzle, Arnold T.	M-61	10/19/18
Rugh, Charles V.	H-25	1/12/18	Schank, Harry E.	H-31	2/23/18
Ruick, Melville H.	M-49	6/29/18	Schary, Harry A.	H-25	1/12/18
Rumfelt, Arthur E.	L-68	11/30/18	Schauss, Frederick A.	M-56	9/14/18
Rundle, W. B.	H-31	2/23/18	Scheidegger, Alvin F.	M-61	10/19/18
Runyan, Clifford R.	M-61	10/12/18	Schellenbach, Gerald H	M-55	9/7/18
Rupp, Wellington	H-8	9/1/17	Scherzer, Ralph J.	H-23	12/15/17
Russell, Charles P.	H-31	2/23/18	Schick, Herbert M.	H-28	2/2/18
Russell, Foster	M-56	3/30/18	Schirm, Raymond J.	M-50	7/27/18
Russell, H. O.	H-8	9/1/17	Schlachter, Henry	H-31	2/23/18
Russell, Horace W.	H-38	4/13/18	Schlatter, Donald W.	H-22	12/8/17
Rutledge, Eric A.	H-30	2/16/18	Schlemmer, Harold P.	I-40	5/4/18
Ryan, Joseph G.	M-56	9/14/18	Schmidt, Ernest E.	M-60	10/12/18
Rymiker, Milton E.	H-29	2/9/18	Schmidt, Joseph F.	M-54	8/31/18
Saboe, Martin L.	M-56	9/14/18	Schneider, Charles M.	M-54	8/31/18
Sales, John P.	H-39	4/20/18	Schock, William O.	I-40	5/4/18
Salmond, John	H-38	4/13/18	Schofield, William	H-12	9/29/17
Samson, Fulton W.	K-76	1/25/19	Scholz, Charles	M-55	9/7/18
Sanborn, William E.	H-40	4/27/18	Schramm, Ned	M-44	6/15/18

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*Did not successfully pass all examinations but was ordered to San Diego before results of examinations were known. Included among the graduates inasmuch as he took all the work and was not discharged from this school.

Name	Date	Page
[illegible]	1850	[illegible]
[illegible]	1850	[illegible]
[illegible]	1850	[illegible]

Appendix _____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Schreuder, Otis B.	H-11	9/22/17	Shaner, Melville W.	M-49	7/20/18
Schroeder, Elmore E.	M-58	9/28/18	Shannon, Loyal E.	M-56	9/14/18
Schroeder, Frederick M.	M-53	8/24/18	Shappell, Maple	H-10	9/15/17
Schuch, Leland S.	I-40	5/4/18	Sharon, Murford C.	H-8	9/1/17
Schuler, George F.	H-28	2/2/18	Sharon, Leon E.	H-28	2/2/18
Schultz, Lloyd G.	H-1	7/14/17	Sharp, Bayard	M-43	6/8/18
Schulze, Laclair D.	H-8	9/1/17	Sharp, Marion B.	M-44	6/15/18
Schumacher, Clyde J.	H-32	3/2/18	Sharp, Selwyn J.	M-56	9/14/18
Schumaither, Hermon O.	H-36	3/30/18	Sharpnack, J. W.	H-2	12/8/17
Schuman, Fred W.	H-39	4/20/18	Shaul, Gilbert L.Jr.	H-22	12/8/17
Schupp, Daniel E.	M-54	8/31/18	Shaw, Donevan L.	H-7	8/25/17
Schwartz, Charles W.	H-30	2/16/18	Shaw, Harold H.	H-39	4/20/18
Schwarzenbek, Francis X.	M-45	6/22/18	Shay, Carleton C.	H-34	3/16/18
Scott, Irvin L.	K-71	12/14/18	Sheehan, Frank E.	H-52a	8/17/18
Scott, James H.	H-33	3/9/18	Sheehy, John F.	H-29	2/9/18
Scott, John M.	H-40	4/27/18	Sheehy, Richard H.	M-54	8/31/18
Scott, Neal J.	H-35	3/25/18	Sheldon, Frederick H.	M-44	6/15/18
Scovell, Harold B.	H-42	5/25/18	Shelton, Milton	M-59	10/5/18
Scoville, Howard H.	M-53	8/24/18	Sheperd, Harry W.	M-46	8/29/18
Scroggins, Lowell V.	K-77	2/1/19	Sheperd, John G.	M-54	8/31/18
Searle, Piatt F.	H-31	2/23/18	Sherer, Bud F.	H-39	4/20/18
Seaton, Charles W.	H-17	11/3/17	Sheridan, Joseph N.	M-58	9/28/18
Seaton, Hunley E.	H-23	12/15/17	Sherman, Fred	H-40	4/27/18
Sebree, George M.Jr.	M-45	6/22/18	Sherman, John K.	H-25	1/12/18
Seeley, Abe L.	H-40	4/27/18	Sherwood, George C.	M-58	9/28/18
Seeman, Louis M.	H-17	11/3/17	Shipton, Washburne D.	H-36	3/30/18
Segal, Abe J.	M-56	9/14/18	Shock, Raymond M.	K-71	12/14/18
Seifert, Frank W.	H-18	11/10/17	Shoenhair, Leland F.	K-74	1/11/19
Seldon, James K.	H-31	2/23/18	Sholtus, Edward T.	M-58	9/28/18
Sells, William R.	M-49	7/20/18	Shortt, Chester A.	M-56	9/14/18
Semple, Andrew	M-62	10/26/18	Shrader, Myron	H-39	4/20/18
Segurson, Raymond P.	M-47	7/6/18	Shrader, Robert S.	M-47	7/6/18
Sexton, Vincent	M-58	9/28/18	Shugard, Donald F.	K-76	1/25/19
Shaffer, Harold B.	M-59	10/5/18	Shull, David R.	H-23	12/15/17
Shane, William K.	M-58	9/28/18	Shumway, Earl J.	M-51	8/3/18

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Abbott, Ralph A.	1	1			
Adams, Carl B.	1	1			
Adams, Edward C.	1	1			
Adams, Frank D.	1	1			
Adams, George E.	1	1			
Adams, Henry F.	1	1			
Adams, Howard G.	1	1			
Adams, Irving J.	1	1			
Adams, James K.	1	1			
Adams, John L.	1	1			
Adams, Kenneth M.	1	1			
Adams, Leonard N.	1	1			
Adams, Martin O.	1	1			
Adams, Norman P.	1	1			
Adams, Oscar Q.	1	1			
Adams, Paul R.	1	1			
Adams, Quentin S.	1	1			
Adams, Robert T.	1	1			
Adams, Stanley U.	1	1			
Adams, Thomas V.	1	1			
Adams, Ulysses W.	1	1			
Adams, Victor X.	1	1			
Adams, Walter Y.	1	1			
Adams, Xavier Z.	1	1			
Baker, Albert A.	2	2			
Baker, Benjamin B.	2	2			
Baker, Charles C.	2	2			
Baker, David D.	2	2			
Baker, Edward E.	2	2			
Baker, Frank F.	2	2			
Baker, George G.	2	2			
Baker, Henry H.	2	2			
Baker, Irving I.	2	2			
Baker, James J.	2	2			
Baker, Kenneth K.	2	2			
Baker, Leonard L.	2	2			
Baker, Martin M.	2	2			
Baker, Norman N.	2	2			
Baker, Oscar O.	2	2			
Baker, Paul P.	2	2			
Baker, Quentin Q.	2	2			
Baker, Robert R.	2	2			
Baker, Stanley S.	2	2			
Baker, Thomas T.	2	2			
Baker, Ulysses U.	2	2			
Baker, Victor V.	2	2			
Baker, Walter W.	2	2			
Baker, Xavier X.	2	2			
Carter, Albert A.	3	3			
Carter, Benjamin B.	3	3			
Carter, Charles C.	3	3			
Carter, David D.	3	3			
Carter, Edward E.	3	3			
Carter, Frank F.	3	3			
Carter, George G.	3	3			
Carter, Henry H.	3	3			
Carter, Irving I.	3	3			
Carter, James J.	3	3			
Carter, Kenneth K.	3	3			
Carter, Leonard L.	3	3			
Carter, Martin M.	3	3			
Carter, Norman N.	3	3			
Carter, Oscar O.	3	3			
Carter, Paul P.	3	3			
Carter, Quentin Q.	3	3			
Carter, Robert R.	3	3			
Carter, Stanley S.	3	3			
Carter, Thomas T.	3	3			
Carter, Ulysses U.	3	3			
Carter, Victor V.	3	3			
Carter, Walter W.	3	3			
Carter, Xavier X.	3	3			
Davis, Albert A.	4	4			
Davis, Benjamin B.	4	4			
Davis, Charles C.	4	4			
Davis, David D.	4	4			
Davis, Edward E.	4	4			
Davis, Frank F.	4	4			
Davis, George G.	4	4			
Davis, Henry H.	4	4			
Davis, Irving I.	4	4			
Davis, James J.	4	4			
Davis, Kenneth K.	4	4			
Davis, Leonard L.	4	4			
Davis, Martin M.	4	4			
Davis, Norman N.	4	4			
Davis, Oscar O.	4	4			
Davis, Paul P.	4	4			
Davis, Quentin Q.	4	4			
Davis, Robert R.	4	4			
Davis, Stanley S.	4	4			
Davis, Thomas T.	4	4			
Davis, Ulysses U.	4	4			
Davis, Victor V.	4	4			
Davis, Walter W.	4	4			
Davis, Xavier X.	4	4			
Evans, Albert A.	5	5			
Evans, Benjamin B.	5	5			
Evans, Charles C.	5	5			
Evans, David D.	5	5			
Evans, Edward E.	5	5			
Evans, Frank F.	5	5			
Evans, George G.	5	5			
Evans, Henry H.	5	5			
Evans, Irving I.	5	5			
Evans, James J.	5	5			
Evans, Kenneth K.	5	5			
Evans, Leonard L.	5	5			
Evans, Martin M.	5	5			
Evans, Norman N.	5	5			
Evans, Oscar O.	5	5			
Evans, Paul P.	5	5			
Evans, Quentin Q.	5	5			
Evans, Robert R.	5	5			
Evans, Stanley S.	5	5			
Evans, Thomas T.	5	5			
Evans, Ulysses U.	5	5			
Evans, Victor V.	5	5			
Evans, Walter W.	5	5			
Evans, Xavier X.	5	5			
Foster, Albert A.	6	6			
Foster, Benjamin B.	6	6			
Foster, Charles C.	6	6			
Foster, David D.	6	6			
Foster, Edward E.	6	6			
Foster, Frank F.	6	6			
Foster, George G.	6	6			
Foster, Henry H.	6	6			
Foster, Irving I.	6	6			
Foster, James J.	6	6			
Foster, Kenneth K.	6	6			
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Foster, Martin M.	6	6			
Foster, Norman N.	6	6			
Foster, Oscar O.	6	6			
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Foster, Quentin Q.	6	6			
Foster, Robert R.	6	6			
Foster, Stanley S.	6	6			
Foster, Thomas T.	6	6			
Foster, Ulysses U.	6	6			
Foster, Victor V.	6	6			
Foster, Walter W.	6	6			
Foster, Xavier X.	6	6			
Green, Albert A.	7	7			
Green, Benjamin B.	7	7			
Green, Charles C.	7	7			
Green, David D.	7	7			
Green, Edward E.	7	7			
Green, Frank F.	7	7			
Green, George G.	7	7			
Green, Henry H.	7	7			
Green, Irving I.	7	7			
Green, James J.	7	7			
Green, Kenneth K.	7	7			
Green, Leonard L.	7	7			
Green, Martin M.	7	7			
Green, Norman N.	7	7			
Green, Oscar O.	7	7			
Green, Paul P.	7	7			
Green, Quentin Q.	7	7			
Green, Robert R.	7	7			
Green, Stanley S.	7	7			
Green, Thomas T.	7	7			
Green, Ulysses U.	7	7			
Green, Victor V.	7	7			
Green, Walter W.	7	7			
Green, Xavier X.	7	7			
Harris, Albert A.	8	8			
Harris, Benjamin B.	8	8			
Harris, Charles C.	8	8			
Harris, David D.	8	8			
Harris, Edward E.	8	8			
Harris, Frank F.	8	8			
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Harris, Martin M.	8	8			
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Harris, Oscar O.	8	8			
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Harris, Quentin Q.	8	8			
Harris, Robert R.	8	8			
Harris, Stanley S.	8	8			
Harris, Thomas T.	8	8			
Harris, Ulysses U.	8	8			
Harris, Victor V.	8	8			
Harris, Walter W.	8	8			
Harris, Xavier X.	8	8			
Irving, Albert A.	9	9			
Irving, Benjamin B.	9	9			
Irving, Charles C.	9	9			
Irving, David D.	9	9			
Irving, Edward E.	9	9			
Irving, Frank F.	9	9			
Irving, George G.	9	9			
Irving, Henry H.	9	9			
Irving, Irving I.	9	9			
Irving, James J.	9	9			
Irving, Kenneth K.	9	9			
Irving, Leonard L.	9	9			
Irving, Martin M.	9	9			
Irving, Norman N.	9	9			
Irving, Oscar O.	9	9			
Irving, Paul P.	9	9			
Irving, Quentin Q.	9	9			
Irving, Robert R.	9	9			
Irving, Stanley S.	9	9			
Irving, Thomas T.	9	9			
Irving, Ulysses U.	9	9			
Irving, Victor V.	9	9			
Irving, Walter W.	9	9			
Irving, Xavier X.	9	9			
Jones, Albert A.	10	10			
Jones, Benjamin B.	10	10			
Jones, Charles C.	10	10			
Jones, David D.	10	10			
Jones, Edward E.	10	10			
Jones, Frank F.	10	10			
Jones, George G.	10	10			
Jones, Henry H.	10	10			
Jones, Irving I.	10	10			
Jones, James J.	10	10			
Jones, Kenneth K.	10	10			
Jones, Leonard L.	10	10			
Jones, Martin M.	10	10			
Jones, Norman N.	10	10			
Jones, Oscar O.	10	10			
Jones, Paul P.	10	10			
Jones, Quentin Q.	10	10			
Jones, Robert R.	10	10			
Jones, Stanley S.	10	10			
Jones, Thomas T.	10	10			
Jones, Ulysses U.	10	10			
Jones, Victor V.	10	10			
Jones, Walter W.	10	10			
Jones, Xavier X.	10	10			
King, Albert A.	11	11			
King, Benjamin B.	11	11			
King, Charles C.	11	11			
King, David D.	11	11			
King, Edward E.	11	11			
King, Frank F.	11	11			
King, George G.	11	11			
King, Henry H.	11	11			
King, Irving I.	11	11			
King, James J.	11	11			
King, Kenneth K.	11	11			
King, Leonard L.	11	11			
King, Martin M.	11	11			
King, Norman N.	11	11			
King, Oscar O.	11	11			
King, Paul P.	11	11			
King, Quentin Q.	11	11			
King, Robert R.	11	11			
King, Stanley S.	11	11			
King, Thomas T.	11	11			
King, Ulysses U.	11	11			
King, Victor V.	11	11			
King, Walter W.	11	11			
King, Xavier X.	11	11			
Lewis, Albert A.	12	12			
Lewis, Benjamin B.	12	12			
Lewis, Charles C.	12	12			
Lewis, David D.	12	12			
Lewis, Edward E.	12	12			
Lewis, Frank F.	12	12			
Lewis, George G.	12	12			
Lewis, Henry H.	12	12			
Lewis, Irving I.	12	12			
Lewis, James J.	12	12			
Lewis, Kenneth K.	12	12			
Lewis, Leonard L.	12	12			
Lewis, Martin M.	12	12			
Lewis, Norman N.	12	12			
Lewis, Oscar O.	12	12			
Lewis, Paul P.	12	12			
Lewis, Quentin Q.	12	12			
Lewis, Robert R.	12	12			
Lewis, Stanley S.	12	12			
Lewis, Thomas T.	12	12			
Lewis, Ulysses U.	12	12			
Lewis, Victor V.	12	12			
Lewis, Walter W.	12	12			
Lewis, Xavier X.	12	12			
Miller, Albert A.	13	13			
Miller, Benjamin B.	13	13			
Miller, Charles C.	13	13			
Miller, David D.	13	13			
Miller, Edward E.	13	13			
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Miller, George G.	13	13			
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Miller, James J.	13	13			
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Miller, Paul P.	13	13			
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Miller, Robert R.	13	13			
Miller, Stanley S.	13	13			
Miller, Thomas T.	13	13			
Miller, Ulysses U.	13	13			
Miller, Victor V.	13	13			
Miller, Walter W.	13	13			
Miller, Xavier X.	13	13			
Nelson, Albert A.	14	14			
Nelson, Benjamin B.	14	14			
Nelson, Charles C.	14	14			
Nelson, David D.	14	14			
Nelson, Edward E.	14	14			
Nelson, Frank F.	14	14			
Nelson, George G.	14	14			
Nelson, Henry H.	14	14			
Nelson, Irving I.	14	14			
Nelson, James J.	14	14			
Nelson, Kenneth K.	14	14			
Nelson, Leonard L.	14	14			
Nelson, Martin M.	14	14			
Nelson, Norman N.	14	14			
Nelson, Oscar O.	14	14			
Nelson, Paul P.	14	14			
Nelson, Quentin Q.	14	14			
Nelson, Robert R.	14	14			
Nelson, Stanley S.	14	14			
Nelson, Thomas T.	14	14			
Nelson, Ulysses U.	14	14			
Nelson, Victor V.	14	14			
Nelson, Walter W.	14	14			
Nelson, Xavier X.	14	14			
Owens, Albert A.	15	15			
Owens, Benjamin B.	15	15			
Owens, Charles C.	15	15			
Owens, David D.	15	15			
Owens, Edward E.	15	15			
Owens, Frank F.	15	15			
Owens, George G.	15	15			
Owens, Henry H.	15	15			
Owens, Irving I.	15	15			
Owens, James J.	15	15			
Owens, Kenneth K.	15	15			
Owens, Leonard L.	15	15			
Owens, Martin M.	15	15			
Owens, Norman N.	15	15			
Owens, Oscar O.	15	15			
Owens, Paul P.	15	15			
Owens, Quentin Q.	15	15			
Owens, Robert R.	15	15			
Owens, Stanley S.	15	15			
Owens, Thomas T.	15	15			
Owens, Ulysses U.	15	15			
Owens, Victor V.	15	15			
Owens, Walter W.	15	15			
Owens, Xavier X.	15	15			
Parker, Albert A.	16	16			
Parker, Benjamin B.	16	16			
Parker, Charles C.	16	16			
Parker, David D.	16	16			
Parker, Edward E.	16	16			
Parker, Frank F.	16	16			
Parker, George G.	16	16			
Parker, Henry H.	16	16			
Parker, Irving I.	16	16			
Parker, James J.	16	16			
Parker, Kenneth K.	16	16			
Parker, Leonard L.	16	16			
Parker, Martin M.	16	16			
Parker, Norman N.	16	16			
Parker, Oscar O.	16	16			
Parker, Paul P.	16	16			
Parker, Quentin Q.	16	16			
Parker, Robert R.	16	16			
Parker, Stanley S.	16	16			
Parker, Thomas T.	16	16			
Parker, Ulysses U.	16	16			
Parker, Victor V.	16	16			
Parker, Walter W.	16	16			
Parker, Xavier X.	16	16			
Quinn, Albert A.	17	17			
Quinn, Benjamin B.	17	17			
Quinn, Charles C.	17	17			
Quinn, David D.	17	17			
Quinn, Edward E.	17	17			
Quinn, Frank F.	17	17			
Quinn, George G.	17	17			
Quinn, Henry H.	17	17			
Quinn, Irving I.	17	17			
Quinn, James J.	17	17			
Quinn, Kenneth K.	17	17			
Quinn, Leonard L.	17	17			
Quinn, Martin M.	17	17			
Quinn, Norman N.	17	17			
Quinn, Oscar O.	17	17			
Quinn, Paul P.	17	17			
Quinn, Quentin Q.	17	17			
Quinn, Robert R.	17	17			
Quinn, Stanley S.	17	17			
Quinn, Thomas T.	17	17			
Quinn, Ulysses U.	17	17			
Quinn, Victor V.	17	17			
Quinn, Walter W.	17	17			
Quinn, Xavier X.	17	17			
Smith, Albert A.	18	18			
Smith, Benjamin B.	18	18			
Smith, Charles C.	18	18			
Smith, David D.	18	18			
Smith, Edward E.	18	18			
Smith, Frank F.	18	18			
Smith, George G.	18	18			
Smith, Henry H.	18	18			
Smith, Irving I.	18	18			
Smith, James J.	18	18			
Smith, Kenneth K.	18	18			
Smith, Leonard L.	18	18			
Smith, Martin M.	18	18			
Smith, Norman N.	18	18			
Smith, Oscar O.	18	18			
Smith, Paul P.	18	18			
Smith, Quentin Q.	18	18			
Smith, Robert R.	18	18			
Smith, Stanley S.	18	18			
Smith, Thomas T.	18	18			
Smith, Ulysses U.	18	18			
Smith, Victor V.	18	18			
Smith, Walter W.	18	18			
Smith, Xavier X.	18	18			
Taylor, Albert A.	19	19			
Taylor, Benjamin B.	19	19			
Taylor, Charles C.	19	19			
Taylor, David D.	19	19			
Taylor, Edward E.	19	19			
Taylor, Frank F.	19	19			
Taylor, George G.	19	19			
Taylor, Henry H.	19	19			
Taylor, Irving I.	19	19			
Taylor, James J.	19	19			
Taylor, Kenneth K.	19	19			
Taylor, Leonard L.	19	19			
Taylor, Martin M.	19	19			
Taylor, Norman N.	19	19			
Taylor, Oscar O.	19	19			
Taylor, Paul P.	19	19			
Taylor, Quentin Q.	19	19			
Taylor, Robert R.	19	19			
Taylor, Stanley S.	19	19			
Taylor, Thomas T.	19	19			
Taylor, Ulysses U.	19	19			
Taylor, Victor V.	19	19			
Taylor, Walter W.	19	19			
Taylor, Xavier X.	19	19			
Underwood, Albert A.	20	20			
Underwood, Benjamin B.	20	20			
Underwood, Charles C.	20	20			
Underwood, David D.	20	20			
Underwood, Edward E.	20	20			
Underwood, Frank F.	20	20			
Underwood, George G.	20	20			
Underwood, Henry H.	20	20			
Underwood, Irving I.	20	20			
Underwood, James J.	20	20			
Underwood, Kenneth K.	20	20			
Underwood, Leonard L.	20	20			
Underwood, Martin M.	20	20			
Underwood, Norman N.	20	20			
Underwood, Oscar O.	20	20			
Underwood, Paul P.	20	20			
Underwood, Quentin Q.	20	20			
Underwood, Robert R.	20	20			
Underwood, Stanley S.	20	20			
Underwood, Thomas T.	20	20			
Underwood, Ulysses U.	20	20			
Underwood, Victor V.	20	20			
Underwood, Walter W.	20	20			
Underwood, Xavier X.	20	20			
Vance, Albert A.	21	21			
Vance, Benjamin B.	21	21			
Vance, Charles C.	21	21			
Vance, David D.	21	21			
Vance, Edward E.	21	21			
Vance, Frank F.	21	21			
Vance, George G.	21	21			
Vance, Henry H.	21	21			
Vance, Irving I.	21	21			
Vance, James J.	21	21			
Vance, Kenneth K.	21	21			
Vance, Leonard L.	21	21			
Vance, Martin M.	21	21			
Vance, Norman N.	21	21			
Vance, Oscar O.	21	21			
Vance, Paul P.	21	21			
Vance, Quentin Q.	21	21			
Vance, Robert R.	21	21			
Vance, Stanley S.	21	21			
Vance, Thomas T.	21	21			
Vance, Ulysses U.	21	21			
Vance, Victor V.	21	21			
Vance, Walter W.	21	21			
Vance, Xavier X.	21	21			
Wilson, Albert A.	22	22			
Wilson, Benjamin B.	22	22			
Wilson, Charles C.	22	22			
Wilson, David D.	22	22			
Wilson, Edward E.	22	22			
Wilson, Frank F.	22	22			
Wilson, George G.	22	22			
Wilson, Henry H.	22	22			
Wilson, Irving I.	22	22			
Wilson, James J.	22	22			
Wilson, Kenneth K.	22	22			
Wilson, Leonard L.	22	22			
Wilson, Martin M.	22	22			
Wilson, Norman N.	22	22			
Wilson, Oscar O.	22	22			
Wilson, Paul P.	22	22			
Wilson, Quentin Q.	22	22			
Wilson, Robert R.	22	22			
Wilson, Stanley S.	22	22			
Wilson, Thomas T.	22	22			
Wilson, Ulysses U.	22	22			
Wilson, Victor V.	22	22			
Wilson, Walter W.	22	22			
Wilson, Xavier X.	22	22			
Young, Albert A.	23	23			
Young, Benjamin B.	23	23			
Young, Charles C.	23	23			
Young, David D.	23	23			
Young, Edward E.	23	23			
Young, Frank F.	23	23			
Young, George G.	23	23			
Young, Henry H.	23	23			
Young, Irving I.	23	23			
Young, James J.	23	23			
Young, Kenneth K.	23	23			
Young, Leonard L.	23	23			
Young, Martin M.	23	23			
Young, Norman N.	23	23			
Young, Oscar O.	23	23			
Young, Paul P.	23	23			
Young, Quentin Q.	23	23			
Young, Robert R.	23	23			
Young, Stanley S.	23	23			
Young, Thomas T.	23	23			
Young, Ulysses U.	23	23			
Young, Victor V.	23	23			
Young, Walter W.	23	23			
Young, Xavier X.	23	23			
Zimmerman, Albert A.	24	24			
Zimmerman, Benjamin B.	24	24			
Zimmerman, Charles C.	24	24			
Zimmerman, David D.	24	24			
Zimmerman, Edward E.	24	24			
Zimmerman, Frank F.	24	24			
Zimmerman, George G.	24	24			
Zimmerman, Henry H.	24	24			
Zimmerman, Irving I.	24	24			
Zimmerman, James J.	24	24			
Zimmerman, Kenneth K.	24	24			
Zimmerman, Leonard L.	24	24			
Zimmerman, Martin M.	24	24			
Zimmerman, Norman N.	24	24			
Zimmerman, Oscar O.	24	24			
Zimmerman, Paul P.	24	24			
Zimmerman, Quentin Q.	24	24			
Zimmerman, Robert R.	24	24			
Zimmerman, Stanley S.	24	24			
Zimmerman, Thomas T.	24	24			
Zimmerman, Ulysses U.	24	24			
Zimmerman, Victor V.	24	24			
Zimmerman, Walter W.	24	24			
Zimmerman, Xavier X.	24	24			

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No	Graduating Date
Siebenbaum, John H.	M-44	6/15/18	Smith, Clement J.	M-49	7/20/18
Silberman, Moe W.	H-28	2/2/18	Smith, C. M.	H-1	7/14/17
Silva, Gay H.	M-49	7/20/18	Smith, Clifton S.	M-54	8/31/18
Simon, Arlo M.	M-53	8/24/18	Smith, Earl W.	M-52	8/10/18
Simon, Herbert J.	H-8	9/1/17	Smith, Edwin C.	M-51	8/3/18
Simons, Neil L.	M-61	10/19/18	Smith, Erle H.	M-46	9/29/18
Simmons, Ralph	H-29	2/9/18	Smith, Ernest L.	M-33	3/9/18
Simpson, Albert G.	H-6	8/18/17	Smith, Ford C.	K-77	2/1/19
Simpson, Harold G.	M-45	6/22/18	Smith, Frank W.	M-42	6/1/18
Simpson, L. B.	H-4	8/4/17	Smith, Fred A.	M-63	11/2/18
Simpson, Ralph T.	H-27	1/26/18	Smith, George E.	H-14	10/13/17
Simpson, Samuel M.	H-29	2/9/18	Smith, George M.	M-33	3/9/18
Simpson, William E.	K-72	12/21/18	Smith, Harrison D.	M-19	11/17/17
Simms, Charles A.	K-70	12/7/18	Smith, H. C.	H-4	8/4/17
Sirkegian, Paul J.	M-57	9/21/18	Smith, Herbert M.	M-26	1/19/18
Sisson, Benjamin F.	M-43	6/8/18	Smith, Irving S.	M-58	9/28/18
Sjoberg, Carl E.	M-58	9/28/18	Smith, James W.	K-77	2/1/19
Skelly, Daniel A.	K-70	12/7/18	Smith, Kenneth D.	M-64	11/9/18
Skolfield, Emery W.	M-57	9/21/18	Smith, L. H.	H-4	8/4/17
Skoning, John H.	H-38	4/13/18	Smith, Malcolm H.	M-56	9/14/18
Skoog, Joe L.	M-54	8/31/18	Smith, Mark E.	M-50	7/27/18
Slater, Clyde Francis	H-20	11/24/17	Smith, Norval B.	M-65	11/16/18
Slater, Glen J.	H-11	9/22/17	Smith, Paul Darr	M-26	1/19/18
Slater, Harry E.	H-23	12/15/17	Smith, Ralph O.	M-57	9/21/18
Slaven, Thomas W.	H-22	12/8/17	Smith, Richard W.	M-57	9/21/18
Sloan, Samuel A.	H-24	12/22/17	Smith, Roy R.	M-55	9/7/18
Sloniger, Eyir L.	H-30	2/16/18	Smith, Samuel H.	M-33	3/9/18
Slover, Clark H.	M-44	6/15/18	Smith, Samuel S.	M-56	9/14/18
Slusser, Horace G.	M-58	9/28/18	Smith, Stanley	H-23	12/15/17
Smathers, Van C.	K-70	12/7/18	Smith, S. H.	H-1	7/14/17
Smead, Armour L.	K-76	1/25/19	Smith, Wesley L.	M-35	3/23/18
Smiley, Erle B.	I-40	5/4/18	Smithers, Claude E.	K-77	2/1/19
Smith, Austin C.	M-52	8/10/18	Smyth, Edward J.	M-12	9/29/17
Smith, Clarence A.	H-36	3/30/18	Sneath, Lee J.	M-56	9/14/18
Smith, Claude H.	M-39	10/5/18	Snell, Raymond C.	M-28	2/2/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Snow, Cedric R.	H-40	4/27/18	Stagner, Lloyd B.	M-58	9/29/18
Snyder, Dean M.	H-23	12/15/17	Stahl, Robert J.	H-17	11/3/17
Snyder, Delmar L.	M-43	6/8/18	Staley, Wesley E.	M-59	10/5/18
Snyder, Edwin L.	M-55	9/7/18	Stanbery, Stanley R.	H-23	12/15/17
Soule, Arthur L.	H-33	3/9/18	Stanford, Frank C.	H-30	2/16/18
Soules, Alton E.	M-62	10/26/18	Stanton, Arthur H.	H-33	3/9/18
Soens, Adolph L.	K-72	12/21/18	Staples, Howard W.	M-52a	8/17/18
South, Charles M.	I-41	5/11/18	Starr, Arthur T.	I-41	5/11/18
Southard, Alfred M.	H-20	11/24/17	Stauffacher, Karl M.	H-7	8/25/17
Southard, Edward O.	K-77	2/1/19	Stauffacher, John D.	K-71	12/14/18
Southwick, John J.	M-49	7/20/18	Stearns, Francis A.	H-22	12/8/17
Southworth, Orville V.	M-51	6/3/18	Stearns, Frank L.	M-48	7/13/18
Spafford, Louis H.	H-29	2/9/18	Stebbins, Barton A.	M-50	7/27/18
Sparling, Edward J.	H-37	4/6/18	Stebbins, John R.	M-55	9/7/18
Speidel, Frank K.	H-30	2/16/18	Stedman, Livingston B.	H-30	2/16/18
Spellman, Sterling B.	H-34	3/16/18	Steffe, Karl	M-50	7/27/18
Spencer, Albert O.	I-41	5/11/18	Steichen, Roman J.	K-75	1/18/19
Spencer, Bonifield M.	H-33	3/9/18	Steigman, Emanuel	M-43	6/8/18
Spencer, Eldridge T.	H-6	8/18/17	Stein, C. V.	M-2	7/21/17
Spencer, Elmer R.	M-29	2/9/18	Steinhart, Morton	M-55	9/7/18
Spencer, Vernon W.	M-29	2/9/18	Stenstrom, Samuel A.	M-21	12/1/17
Spicer, Walter S.	M-57	9/21/18	Stephens, Frank W.	M-55	9/7/18
Spier, James S.	H-28	2/2/18	Stephenson, Arthur W.	H-35	3/23/18
Spilman, Louis	M-33	3/9/18	Stephenson, James M.	M-49	7/20/18
Spiner, Louis H.	M-32	3/2/18	Stephenson, T. B.	M-9	9/8/17
Spitzel, Herman	M-58	9/14/18	Sternbergh, Lambert	M-52	8/10/18
Spörlein, Louis W.	M-30	2/16/18	Sterrett, William C.	K-71	12/14/18
Sprague, Hollister T.	H-13	10/7/17	Stetson, Philip C.	H-29	2/9/18
Spriegel, William R.	H-28	2/2/18	Stevens, Robert R.	K-72	12/21/18
Sprinkle, Lloyd H.	M-52	8/10/18	Stevens, Thaddeus J.	M-36	3/30/18
Sproul, Harry A.	M-43	6/8/18	Stevenson, Norman M.	H-35	3/23/18
Stafford, Harold L.	M-57	9/21/18	Stewart, Clyde E.	M-47	7/6/18
Stafford, James N.	M-66	11/23/18	Stewart, Earl F.	H-3	7/28/17
Stafford, Raub M.	M-60	10/12/18	Stewart, Hal V.	M-42	5/25/18
Stagg, George T.	M-57	9/21/18	Stewart, Harold L.	M-51	8/3/18

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Stewart, Ronald B.	M-61	10/19/18	Sullivan, Daniel J.	H-23	12/15/17
Stewart, William F.	H-13	10/6/17	Sullivan, Gerald M.	M-61	10/19/18
Stewart, William L.	M-53	8/24/18	Sullivan, Henry B.	H-24	12/22/17
Stewart, William Van.V.	H-13	10/6/17	Sullivan, Leonard	H-20	11/24/17
Still, Leslie E.	H-29	2/9/18	Sullivan, William S.	H-32	3/2/18
Stillman, Clinton	M-63	11/2/18	Summerfield, Vernon D.	H-28	2/2/18
Stites, James W.	H-30	2/16/18	Suppes, Raymond L.	H-13	10/6/17
Stitt, Donald G.	H-26	1/19/18	Sutcliffe, John R. Jr.	M-66	11/23/18
Stock, Sidney R.	M-61	10/19/18	Sutherland, John R.	M-54	8/31/18
Stoddard, David I.	H-24	12/22/17	Sutter, Howard F.	M-54	8/31/18
Stoffer, Charles T.	H-30	2/16/18	Sutter, Julius F.	H-29	2/9/18
Stone, Archie A. Jr.	H-30	2/16/18	Sutton, Harold P.	H-24	12/22/17
Stone, Percy A.	H-28	2/2/18	Sutton, Harry A.	H-3	7/28/17
Stoner, Rex K.	H-17	11/3/17	Sutton, Wayne C.	L-42	5/25/18
Stoops, Robert C.	H-27	1/26/18	Suver, Elmer W.	H-31	2/23/18
Storey, Jack H.	H-28	2/2/18	Swaller, Sidney R.	H-30	2/16/18
Storie, Raymond E.	M-55	9/7/18	Swen, Harry T.	K-75	1/18/19
Storrie, Walter	M-46	6/29/18	Swanner, John L.	M-49	7/20/18
Stout, Sidney A.	H-33	3/9/18	Swanson, Charles L.	M-57	9/21/18
Stratton, Edwin L.	H-37	4/6/18	Swem, John B.	M-20	11/24/17
Strawn, Donald C.	H-17	11/3/17	Sweeney, David R.	H-36	3/30/18
Strehle, Robert L.	H-35	3/23/18	Sweeney, Joseph E.	M-55	9/7/18
Stribling, George E.	M-58	9/28/18	Swigert, Ernest G.	H-35	3/23/18
Stringham, Earde B.	H-37	4/6/18	Swinger, Joseph F.	H-21	12/1/17
Strong, Foster G.	H-28	2/2/18	Swinson, Caspar D.	H-36	3/30/18
Strong, Frederick A.	M-48	7/13/18	Switzer, Lewis	M-43	6/8/18
Strong, George E.	H-23	12/15/17	Sydney, Philip	K-70	12/7/18
Struthers, Bruce	H-20	11/24/17	Symes, Harold B.	M-51	8/3/18
Stuart, George D.	H-19	11/17/17	Symonds, Harry R.	M-58	9/28/18
Stukey, David C.	H-25	1/12/18	Symonds, Merrill E.	H-28	2/2/18
Stuller, Gilbert F.	H-28	2/2/18	Symons, Spencer W.	H-13	10/6/17
Sturgis, Carl B.	H-36	3/30/18	Symons, Thomas W.Jr.	H-33	3/9/18
Stutzman, Theodore B.	H-29	2/9/18	Talbot, William C.	H-16	10/27/17
Suhr, Donald L.	M-44	6/15/18	Tallman, Buell J.	K-76	1/25/19
Suits, Charles W.	M-51	8/3/18	Tanner, Talman	W-12	9/29/17

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Tate, LeRoy M.	H-31	2/23/18	Thompson, Harry S.	K-77	2/1/19
Tattersfield,Ernest E.	K-77	2/1/19	Thompson, Henry	H-32	3/2/18
Tatum, Albert S.	M-59	10/5/18	Thompson, John F.	H-35	3/23/18
Taub, Earl A.	M-67	11/30/18	Thompson, Lloyd G.	M-58	9/28/18
Taubert, Max G.	M-55	9/7/18	Thompson, Roland S.	H-21	12/1/17
Taylor, Alfred B.	H-33	3/9/18	Thornburg, David W.	H-29	2/9/18
Taylor, Benjamin H.	H-18	11/10/17	Thorne, William B.	H-38	4/13/18
Taylor, George F.	H-36	3/30/18	Thygeson, Elling	M-52	8/10/18
Taylor, Homer C.	M-48	7/13/18	Thymnes, Louis C.	H-23	12/15/17
Taylor, Leon B.	H-55	9/7/18	Tice, Thomas C.	H-29	2/9/18
Taylor, Lloyd J.	H-31	2/23/18	Tiller, James J.r	K-71	12/14/18
Taylor, Milton E.	M-61	10/19/18	Tipton, Andrew R.	H-29	2/9/18
Taylor, Russell V. **	M-52	8/10/18	Todd, Clarence W.	H-35	3/23/18
Taylor, Phillip B. **	M-60	10/12/18	Todd, Edwin T.	H-21	12/1/17
Taylor, William R.	M-58	9/28/18	Toews, Fritz G.	M-57	9/21/18
Taylor, Willis R.	H-24	12/22/17	Tolbert, Benjamin H.	H-23	12/15/17
Templeton, John W.	H-24	12/22/17	Tomlinson, Kenneth C.	H-33	3/9/18
Templeton, Robert L.	H-37	4/6/18	Toncray, Henry S.	M-59	10/5/18
Templin, Ralph T.	M-65	11/16/18	Torney, Stewart W.	H-17	11/3/17
Terrett, Julian	I-41	5/11/18	Tout, Herbert W.	M-54	8/31/18
Terry, Raleigh W.	M-48	7/13/18	Towne, Josiah M.	M-35	3/23/18
Terry, S. W.	H-2	7/21/17	Towne, William B.	M-57	9/21/18
Teutsch, William L.	M-61	10/19/18	Townsend, Edward S.	H-21	12/1/17
Tevis, Gordon B.	H-14	10/13/17	Townsend, Lewis A.	M-51	8/3/18
Thalheimer, Ulrich S.	H-33	3/9/18	Towsley, Philip W.	M-58	9/28/18
Thatcher, Edward R.	M-51	8/3/18	Tozer, George A.	H-36	3/30/18
Thayer, H. W.	H-2	7/21/17	Tracy, Ray P.	H-29	2/9/18
Thierbach, George C.	H-31	2/23/18	Trask, Elwood E.	M-55	9/7/18
Thomas, Clyde	H-17	11/3/17	Troughber, Leslie K.	K-70	12/7/18
Thomas, Eldred L.	M-55	9/7/18	Treat, Verne E.	H-19	11/17/17
Thomas, James R.	H-38	4/13/18	Tresidder, Don	H-36	3/30/18
Thomas, Millard P.	I-40	5/4/18	Tribe, Frank L.	M-56	9/14/18
Thomas, William E.	H-39	4/20/18	Trotter, Keith F.	M-51	8/3/18
Thompson, Franklin S.	H-32	3/2/18	Trout, William H.	M-48	7/13/18
Thompson, Harry S.	H-39	4/20/18	Trowbridge, James O.	H-31	2/23/18

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** Invert order

Journal of Library Automation - Revised.

Pete, Leroy J.	M-23	3/25/19	Watson, Henry C.	E-17	1/1
Thornfield, Ernest E.	A-17	11/2/18	Wilson, Mary		
[illegible], [illegible]	A-23	11/5/18	Thompson, Dora J.		
Thomas, Alfred P.	A-23	11/8/18	Thompson, Alfred P.		10/30/18
Thomas, Max C.	A-23	11/8/18	Thompson, Roland D.		
Taylor, [illegible]	R-23	3/30/18	Reg, Anna M.		
Taylor, Geoffrey B.	A-23	11/8/18	[illegible], [illegible]		4/16/19
[illegible], [illegible]	A-23	3/30/18	[illegible], [illegible]		
Taylor, Homer W.	A-23	11/28/18	Spencer, Doris C.		
Taylor, Leon D.	A-23	11/8/18	Thomas, Thomas G.		1-Dec
			Tiller, [illegible]		12/14/18
[illegible], Milton E.			Tipton, Andrew D.		5/6 18
[illegible], [illegible]			[illegible], [illegible]		
Taylor, Phillip B.	A-23	10/12/18	Tom, Austin R.		11-Oct
[illegible], William H.			Tomlin, Peter T.		10/18
[illegible], Willis R.		12/21/17	Trimble, Benjamin R.		
[illegible], [illegible]		12/20/17	Trimmer, Kenneth C.		
Television, Norris L.			[illegible], [illegible]		
[illegible], Ralph E.			[illegible], Charles R.		
[illegible], [illegible]			Tune, Raymond A.		8/23/18
[illegible], [illegible]		7/19/18	[illegible], Joseph M.		10/18
[illegible], [illegible]			Tuno, William S.		
Urban, Phillip L.	A-23		Tunwood, Lenard S.		
Urie, Vernon S.	A-23		[illegible], [illegible]		8/5/18
Underhill, Lloyd S.	A-23		[illegible], Orville W.		8/28/18
[illegible], [illegible]			[illegible], Joseph [illegible]		
[illegible], [illegible]		11/17/17	[illegible], [illegible]		
Vibert, [illegible]	A-23	3/30/18	[illegible], [illegible]		
[illegible], [illegible]			Vaughn, Orville E.		
[illegible], [illegible]			Veach, Thomas [illegible]		
Vivian, [illegible]			Vreeland, Dan [illegible]		10/18
Vinson, Milford F.	A-23		Vyle, [illegible]		9/10/18
Vinson, Truscott S.	A-23		Vrotter, Keith F.		
Vogel, [illegible]			Vrout, William [illegible]		
Vogel, [illegible]	A-23		Vroutenbush, James D.		

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Tupper, Preston E.	H-32	3/2/18	Wachtel, Leonard R.	M-42	6/1/18
Turnbull, Ray W.	M-47	7/6/18	Waddell, Chauncey L.	H-31	2/23/18
Turner, Fred D.	M-59	10/5/18	Waddell, Joseph	H-6	8/18/17
Turner, Henry E. Jr.	H-12	9/29/17	Wade, Herbert C.	H-22	12/8/17
Turrill, Gardner	H-28	2/2/18	Wagner, Paul T.	M-48	7/13/18
Tussing, Earl B.	H-30	2/16/18	Waite, Herbert E. Jr.	H-28	2/2/18
Tyrer, Tom D.	M-42	6/1/18	Waite, John D. Jr.	H-36	3/30/18
*Tyrrel, Charles P.	H-3	7/28/17	Walberg, Hilding	M-51	8/3/18
Umbarger, Francis B.	M-62	10/26/18	Waldo, Herbert S.	H-33	3/9/18
Vanasek, Tomas S.	M-60	10/12/18	Wales, Kenneth S.	H-17	11/3/17
Van Auken, Jerome T.	H-19	11/17/17	Wales, Roy E.	H-3	7/28/17
Van Bibber, Ray O.	H-23	12/15/17	Walker, Clarence R.	H-23	12/15/17
Valle, Paul	H-19	11/17/17	Walker, Clifton H.	M-42	6/1/18
Vancura, Joseph F.	M-53	8/24/18	Walker, Edward W.	M-45	6/22/18
Vanbensselaer, Maunell	K-72	12/21/18	Walker, Edwin S.	M-46	6/29/18
Varney, Walter T.	M-47	7/6/18	Walker, Glenn D.	M-43	6/8/18
Varnum, Ernest R.	M-48	7/13/18	Walker, Henry M.	M-54	8/31/18
Veitch, Samuel L.	K-69	11/30/18	Walker, Howe,	H-23	12/15/17
Velte, Charles H.	H-38	4/13/18	Walker, Joseph L.	H-15	10/20/17
Vernon, Charles C. Jr.	H-25	1/12/18	Walker, Kenneth N.	M-44	6/15/18
Vernon, Fred	H-26	1/19/18	Walker, Paul	M-58	9/28/18
Vessey, Burton F.	H-29	2/9/18	Walker, Virgil L.	M-63	11/2/18
Vierra, Joseph R.	M-58	9/28/18	Walker, Waldo C.	H-35	3/23/18
Vilas, Edward P.	M-53	8/24/18	Walker, Warren H.	H-20	11/24/17
Vincent, Eugene C.	M-58	9/28/18	Walker, William L.	M-45	6/22/18
Vincent, J. D.	H-5	8/11/17	Wall, Earle R.	M-50	7/27/18
Vint, Thomas C.	H-17	11/3/17	Wall, Hampton G.	M-65	11/16/18
Von Adelung, Edward	H-14	10/13/17	Wallace, H. S.	H-1	7/14/17
Vogeltanz, Edward L.	M-55	9/7/18	Wallace, Herbert A.	M-67	11/30/18
Voigt, Edwin E.	M-49	7/20/18	Wallace, Karl E.	H-29	2/9/18
Vollman, Roy W.	H-6	8/18/17	Wallace, Lawrence A.	M-56	9/14/18
Voorhees, Garret S.	H-31	2/23/18	Wallace, Lucian E.	M-56	9/14/18
Vorachek, Frank L.	M-50	7/27/18	Wallace, Orval [illegible].	M-52a	8/17/18
Vorhees, Melvin	M-52	8/10/18	Wallen, John V.	M-43	6/8/18
Vrang, Christian	M-58	9/28/18	Walsh, Edward M. Jr.	H-3	7/28/17

Total to bottom of this sheet - 2801

*Did not successfully pass all examinations but was ordered to San Diego before results of examinations were known. Included among the graduates inasmuch as he took all the work and was not discharged from this school.

[illegible]

[illegible]

[illegible]

Appendix _____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Walter, William S.	I-41	5/11/18	Webber, Charles L.	H-53	8/24/18
Walters, Harold B.	M-56	9/14/18	Webster, Carl B.	H-40	4/27/18
Waltham, Ralph O.	H-31	2/23/18	Webster, Charles B.	H-27	1/26/18
Waltz, Henry W.	M-43	6/8/18	Webster, John Ordway	H-19	11/17/17
Wand, Preston B.	H-33	3/9/18	Wedekind, Richard E.	M-61	10/19/18
Ward, Charles H.	I-41	5/11/18	Weed, Robert O.	M-46	6/29/18
Ward, Harold L.	M-54	8/31/18	Weeks, H. M.	H-9	9/8/17
Ward, Lawrence A.	H-17	11/3/17	Weeks, J. S.	H-1	7/14/17
Ward, M. L.	H-9	9/8/17	Weill, Lawrence I.	H-41	4/27/18
Ward, Paul A.	M-44	6/15/18	Weissman, Arnold E.	H-29	4/20/18
Warde, Arthur F.	H-35	3/23/18	Weitekamp, Elmer J.	H-24	12/22/17
Ware, John A.	M-57	9/21/18	Welch, Paul R.	H-24	12/22/17
Warner, Jay L.	M-45	6/22/18	Welch, Peter W.	H-34	3/16/18
Warner, Leon G.	M-43	6/8/18	Welden, Walter I.	M-56	9/28/18
Warner, Orville H.	M-44	6/15/18	Wellman, Harrison W.	H-30	2/16/18
Warren, Frank B.	M-52	8/10/18	Wells, Harold H.	H-20	11/24/17
Warrington, Jesse G.	M-56	9/14/18	Wells, Hoestis I.	K-72	12/21/18
Watchorn, Emory B.	H-6	8/18/17	Wells, Howard H.	H-23	12/15/17
Waterhouse, Frederick	H-36	3/30/18	Wells, Nathan L.	M-42	6/1/18
Waterman, E. S.	H-2	7/21/17	Wells, Roe E.	H-20	11/24/17
Waters, George B.	M-13	10/6/17	Wells, William C.	M-44	6/15/18
Waters, James F.	M-66	11/23/18	Welty, Donald R.	M-47	7/6/18
Waters, Leland R.	M-55	9/7/18	Wendell, Lay A.	H-25	1/12/18
Waters, Philip L.	H-39	4/20/18	Wendler, Kenneth S.	K-77	2/1/19
Watkins, Dudley W.	H-18	11/10/17	Wenzlau, Charles W.	H-31	2/23/18
Watkins, F. C.	M-9	9/8/17	Werneth, Louis S.	H-28	2/2/18
Watson, Frank H.	K-74	1/11/19	West, Norman S.	H-28	2/2/18
Watson, Frederick F.T.	H-38	4/13/18	West, Stewart N.	M-45	6/22/18
Watson, Harry B.	M-56	9/14/18	Westby, Louis I.	H-40	4/27/18
Watson, Hugh	H-30	2/16/18	Westcott, Leo B.	M-44	6/15/18
Watson, IRa G.	K-77	2/1/19	Westerhaus, Luther W.	H-30	2/16/18
Watson, Ralph	H-30	4/20/18	Weyerhauser, F.	H-5	8/11/17
Weaver, Edward M.	M-45	6/22/18	Whalley, Wan Delos	H-12	9/29/17
Webb, Henry W.	H-30	2/16/18	Wheatley, Paul V.	M-57	9/21/18
Webb, Sigel G.	H-31	2/23/18	Wheeler, Commodore P.	K-76	1/25/19

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Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date
Wheeler, Howard T.	H-23	12/15/17
Wheeler, Mark S.	M-51	8/3/18
Wheeler, Oliver P.	H-33	3/9/18
Wheeler, William L.	M-44	6/15/18
Wheeler, William S.	M-56	9/14/18
Wheless, William M.	H-28	2/2/18
Whelihan, John F. Jr.	H-31	2/23/18
White, Abraham B.	M-62	10/26/18
White, Azmon D.	M-48	7/13/18
White, Charles D.	M-44	6/15/18
White, Daryl E.	H-12	9/29/17
White, David L.	M-61	10/19/18
White, Francis P.	K-74	1/11/19
White, George L.	H-38	4/13/18
White, Harold C.	M-28	2/2/18
White, Roy W.	H-11	9/22/17
White, William E.	M-65	11/16/18
White, William J.	L-42	5/25/18
Whitehead, Fred E.	I-40	5/4/18
Whitelaw, James C.	H-39	4/20/18
Whiteside, Robert B.	H-30	2/16/18
Whiting, Frederick C.	M-60	10/12/18
Whitney, Chauncey B.	M-57	9/21/18
Whitney, Vinal I.	M-62	10/26/18
Whittemore, Noble E.	M-55	9/7/18
Whitten, Lester C.	M-55	9/7/18
Wichart, William F.	H-1	7/14/17
Widenham, John M.	H-37	4/6/18
Wiegman, John P.	H-32	3/2/18
Wieman, Elton E.	M-53	8/24/18
Wieslander, Leslie R.	H-33	3/9/18
Wightman, Norman H.	H-31	2/23/18
Wilbur, Clifford H.	I-40	5/4/18
Wilbur, Lewis	H-74	12/14/18
Wilcox, Claude V.	M-45	6/22/18
Wilde, Arthur W.	M-51	8/3/18
Wiley, Clarence D.	H-33	3/9/18
Wiley, Dana	H-39	4/20/18
Wiley, Esmond F.	H-35	3/23/18
Wilke, Royal G.	H-24	12/22/17
Wilkeson, Livingston E.	H-34	3/16/18
Wilkie, Donald W.	M-54	8/31/18
Wilkins, Glenn B.	H-17	11/3/17
Wilkins, Leslie T.	M-66	11/23/18
Wilkins, Paul C.	H-30	2/16/18
Wilkinson, John A.	H-28	2/2/18
Will, Edward C.	M-53	8/24/18
Willard, D. W.	M-9	9/8/17
William, Lawrence J.	M-50	7/27/18
Williams, Alfred G. Jr.	H-25	1/12/18
Williams, Alfred L.	M-31	2/23/18
Williams, Edward L.	M-3	7/28/17
Williams, Ernest E.	M-41	5/11/18
Williams, Glenn B.	H-31	2/23/18
Williams, Merschell O.	M-18	11/10/17
Williams, Hugh J.	M-66	11/23/18
Williams, Isaac J.	H-22	12/8/17
Williams, Joseph	M-53	8/24/18
Williams, Paul	M-48	7/13/18
Williams, Paul D.	H-30	2/16/18
Williams, Paul L.	H-23	12/15/17
Williams, Philip	H-31	2/23/18
Williams, Rex W.	M-54	8/31/18
Williams, Teel	M-55	9/7/18
Williams, W. A.	M-5	8/11/17
Williams, Walden R.	K-69	11/30/18
Williams, Warren L.	M-36	3/30/18
Williams, William G.	M-46	6/29/18
Williams, William P.	M-34	3/16/18
Williams, William W.	M-55	9/7/18

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[illegible], Howard A.	--	[illegible]	[illegible], Edgo, Arthur W.	--	9/25/18
[illegible], [illegible] A.	--	[illegible]	[illegible], [illegible]	--	--
[illegible], Oliver I.	--	[illegible]	[illegible], Dan	--	--
[illegible], William L.	--	[illegible]	[illegible], Osmond F.	--	--
[illegible], William S.	--	9/16/18	[illegible]	--	--
[illegible], William W.	--	[illegible]	[illegible], Delphinette	--	--
[illegible], [illegible]	D-21	[illegible]	[illegible], Oswald V.	--	--
[illegible], Alexander B.	--	[illegible]	[illegible], Glenn R.	--	-17
[illegible], [illegible] R.	--	[illegible]	[illegible], Dorothy T.	--	--
[illegible], Clarence C.	--	[illegible]	[illegible]	--	--
Hibbs, Darrel E.	--	[illegible]	[illegible], John A.	--	--
Hibbs, Harry L.	-21	[illegible]	[illegible], [illegible]	--	--
Hibbs, [illegible]	--	[illegible]	[illegible], D. E.	--	--
Hibbs, Warren E.	--	[illegible]	[illegible], [illegible]	--	--
Hibbs, Leonard C.	--	9/16/18	[illegible], Alfred C.	--	--
Hibbs, Roy E.	--	[illegible]	[illegible], [illegible]	--	--
[illegible], [illegible]	--	[illegible]	[illegible], Howard L.	--	9/25/18
[illegible], [illegible]	--	[illegible]	[illegible], Clarence E.	--	--
[illegible], [illegible]	--	[illegible]	[illegible], Glen A.	--	-21
Hibsosville, Thomas O.	--	9/20/18	[illegible], Theodore	--	--
Hibsville, Robert E.	--	9/14/18	[illegible], John A.	--	--
Hibsville, Theodore O.	--	10/14/18	[illegible], Isaac A.	--	--
Hibsville, [illegible]	--	[illegible]	[illegible], Joseph	--	--
Hibsville, Virgil L.	--	[illegible]	[illegible], Adam	--	--
Hibtsmore, Bobie E.	--	[illegible]	[illegible], Ward D.	--	--
Hibtsmore, Chester C.	--	[illegible]	[illegible], Paul E.	--	--
Hibtsmore, [illegible]	--	9/14/17	[illegible], Philip	--	--
Hibtsmore, John E.	--	[illegible]	[illegible]	--	--
Hibtsmore, John L.	--	9/13/18	[illegible], Thad	--	9/9/18
Hibtsmore, [illegible]	--	[illegible]	[illegible], H. A.	--	--
Hibtsmore, Leslie E.	--	9/18	[illegible], William E.	--	--
Hibtsmore, [illegible] H.	--	[illegible]	[illegible], [illegible]	--	--
Hibtsmore, Obediah M.	--	[illegible]	[illegible], William	--	--
Hibtsmore, [illegible]	--	[illegible]	[illegible], [illegible] V.	--	9/18/18
Hibtsmore, [illegible] V.	--	[illegible]	[illegible]	--	--

Appendix ____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date	Name	Sqdn.No.	Graduating Date
Williamson, Harlan A.	H-36	3/30/18	Wishard, Leslie W.	H-10	9/15/17
Willits, Emory E.	K-72	12/21/18	Witbeck, Robert R.	H-35	3/23/18
Willson, Raymond A.	K-77	2/1/19	Witmer, Joseph P.	K-76	1/25/19
Wilmeth, Elmer L.	H-55	9/7/18	Witt, Joseph B.	H-37	4/6/18
Wilsford, Thomas F.	H-64	11/9/18	Wixcey, Earl	H-58	9/28/18
Wilson, Arthur H.	H-56	9/14/18	Wohler, Chester B.	H-19	11/17/17
Wilson, Billy	M-45	6/22/18	Wpitishek, Alfred J.	H-64	11/9/18
Wilson, Edward E.	H-37	4/6/18	Woitishek, Louis A.	H-2	7/21/17
Wilson, Floyd A.	H-29	2/9/18	Wolf, John E.	H-33	3/9/18
Wilson, F. G.	H-4	8/4/17	Wolfe, Everett L.	H-38	4/13/18
Wilson, Gordon	H-58	9/28/18	Wolfe, Kenneth B.	H-35	3/23/18
Wilson, Harold T.	M-52a	8/17/18	Wolff, Herman F.	M-56	9/14/18
Wilson, James E.	M-42	6/1/18	Wood, Albin F.	K-75	1/18/19
Wilson, James R.	M-60	10/12/18	Wood, Benjamin N.	L-68	11/30/18
Wilson, Joseph S.	M-62	10/26/18	Wood, Edward H.	H-7	8/25/17
Wilson, Maurice W.	H-31	2/23/18	Wood, Harry L.	M-62	10/26/18
Wilson, Meredith L.	M-52a	8/17/18	Wood, Lester S.	H-37	4/6/18
Wilson, William A.	L-68	11/30/18	Wood, Walter J.	I-40	5/4/18
Wilson, William G.	M-45	6/22/18	Woodman, Cony U.	H-7	8/26/17
Wilson, W. S.	A-1	7/14/17	Woodward, Ross E.	H-33	8/24/18
Wincote, Charles B.	H-31	2/23/18	Woolley, Douglas F.	M-44	6/15/18
Wine, Edward A.	H-30	2/16/18	Woolston, Fletcher S.	H-55	9/7/18
Wing, Hugh A.	K-53	8/24/18	Worsham, George A.	H-32	3/2/18
Wing, Leo	H-28	2/2/18	Wotton, Thomas A.	H-3	8/18/17
Wing, Leon M. Jr.	H-56	9/14/18	Wright, Arthur W.	H-30	7/27/18
Wing, Lester L.	H-54	8/31/18	Wright, Fay L.	H-40	4/27/18
Winner, William L.	H-36	3/30/18	Wright, Harold H.	K-76	1/25/19
Winning, Samuel E.	H-53	8/24/18	Wright, Percy C.	K-77	2/1/19
Winslow, K.	K-9	9/8/17	Wright, William E.	A-1	7/14/17
Winter, Henry E.	H-40	4/27/18	Wright, William M.	H-34	3/16/18
Wire, Harold G.	K-76	1/25/19	Wriston, Roscoe C.	H-31	2/23/18
Wirt, Harry M.	H-34	3/16/18	Wuenker, Ralph F.	H-30	2/16/18
Wirz, Walter	H-25	1/12/18	Wulfekuhler, Irving W.	M-60	10/12/18
Wisdom, Everett S.	H-43	6/8/18	Wyckoff, Harry W.	H-19	11/17/17
Wise, Andrew B.	H-45	6/22/18	Wylie, John	H-34	3/16/18

Total to bottom of this sheet - 3011

Appendix _____.

Graduates - School of Military Aeronautics - Berkeley.

Name	Sqdn.No.	Graduating Date
Wyman, Sprague B.	H-14	10/13/17
Wymer, Harold J.	M-66	11/23/18
Yerkes, William D.	M-37	4/6/18
Young, Ernest E.	M-44	6/15/18
Young, Fred	M-38	4/13/18
Young, George E.	M-31	2/23/18
Young, Gerald C.	M-46	6/29/18
Young, Harry H.	M-53	8/24/18
Young, John H.	M-46	6/29/18
Young, Otis G. Jr.	M-59	10/5/18
Young, Thomas A.	M-49	7/20/18
Youngs, Grover A.	M-28	2/2/18
Zacher, Edwin F.	M-21	12/1/17
Zander, William E.	M-31	2/23/18
Zane, Robert T.	M-29	2/9/18
Zant, Lawrence N.	M-65	11/16/18
Zaugg, Feliz R.	M-54	8/31/18
Ziebur, Max C.	M-18	11/10/17
Ziesmer, George F.	M-23	12/15/17
Zimmerman, Karl H.	M-33	3/9/18
Zumwinkel, Otto H.	M-56	9/14/18

TOTAL --- 3032

APPENDIX L3.

Contains the following:

Discharge Rules Under Which The School Operated
(Also see Appendix F7)

Memorandum No. 232 (2 pages)
Memorandum No. 295 (2 pages)

Appendix

WAR DEPARTMENT
N-g
Office of the Chief Signal Officer,
Washington.

October 30, 1917.

MEMORANDUM No. 232 TO ALL SCHOOLS:

1. The following rules govern discharges of candidates from the Schools of Military Aeronautics. They supersede all prior memoranda:

(a) A student may be discharged at any time during his course of training by reason of failure to pass tests or examinations; by giving evidence to his Commanding Officer that he is unfitted mentally, morally or physically for the duties of a flying officer; or for any other reason which, in the opinion of the Examing Board subject to such approval as is necessary, renders his services no longer required.

(b) No candidate will be sent to a flying school who has not passed all final examinations in the Ground School, and candidates who fail but have excellent records for conduct and diligence may, at the option of the Commandant, be permitted to repeat examinations. Those who fail to pass or whose record for conduct and diligence is not creditable will be recommended for discharge.

(c) The Examing Board, when dealing with recommendations for discharge, shall consist of the Commandant and at least one other commissioned officer. In cases where an inquiry into the physical condition of a candidate is necessary, the Board shall consist of the officers above specified and one medical officer in addition thereto. This Board will summon candidates proposed for discharge. The senior member will explain to the candidate the charges, as, for example: failure in military studies, unmilitary conduct, indifference, inefficiency, etc. The candidate will have the opportunity to reply. His reply will be noted in the proceedings of the Board, togerher with the comments of the Examiring Board thereon, and will be forwarded to this office as a part of its record. This record should also contain a statement from the candidate of the place where he was examined upon his application for admission to the school.

(d) Commandants will discharge students immediately upon recommendation of the Board of Examiners and will furnish the candidate with his discharge papers. Where the discharge is given for the reason that the man has proven himself unfitted mentally or otherwise for the duties of a flying officer, he will be given an honorable discharge for the reason that his services are no longer required.

duties of the Chief Flying Officer.

(e) Report of this action should be wired immediately to this office. Full report to this office should follow giving a full statement of the case and the reasons why the discharge was recommended. This report should be attested by the Adjutant. The letter will give the entire record of the man discharged, including his marks in all subjects, and in conduct and efficiency during his entire stay at the School up to the time the the Board recommended him for discharge. The letter will quote the entire proceedings of the Board with regard to the discharge and will state whether the vote was unanimous or not. This report will be made in duplicate.

(f) In addition to this, a report indicating the ground for discharge should be made by letter through military channels, to the Adjutant General of the Army. This letter should be a separate communication from the reports made to this office and need not be made through this office. Blank forms which may be used for this purpose are being prepared by this office and a supply will be sent as soon as available.

(g) In all cases in which the candidate has claimed exemption from the draft, the Commandant should notify the local Board of the candidate, and the Adjutant General of the State in which said Board is situated, of the discharge.

2. Your attention is called to the provisions of Special Regulations No. 49, revised August 15, 1917, which prescribes the general rules applicable to discharged from all training camps.

By direction of the Acting Chief Signal Officer:

Hiram Bingham.

Lt. Col., Signal Corps.

A true copy.

(Signed) John H. Alden,

Captain A.S., S.C., U.S.R.

Air Division
Training Section
Schools Section
14th & Park Road.

WAR DEPARTMENT
Office of the Chief Signal Officer,
Washington.

April 3, 1918.

MEMORANDUM NO. 295 FOR ALL SCHOOLS: (Supplementing Memo. #232).

DISCHARGE RULES.

1. A cadet is liable to demotion under the following conditions: (Exception Par.8)
   (a) Two failures in one week
   (b) One failure and two marks (60-65) in one week
   (c) Failure in any final examination
   (d) Two consecutive failures in the same subject.

2. Failures and low marks except as mentioned above and in paragraph 4, should not be considered cause for demotion or discharge.

3. A cadet should be demoted the first time he is liable to demotion and should be discharged the second time.

4. Exceptions to paragraphs 2 and 3 above may be made at the discretion of the Examining Board for extraordinary reasons. (memo #232, Oct. 30, 1917). In such cases, a special report shall be furnished this office under the heading "Remarks" of the Board Proceedings.

5. A cadet may be discharged at the direction of the Examining Board as heretofore if he is evidently unfitted to be made an officer (memo.#232).

6. Failure in Efficiency should count as failure in one subject with respect to demotion and discharge.

7. A cadet's mark in Efficiency shall be determined each week by a Board appointed by the Commandant. It shall be based on weekly reports from the Cadet's instructors, etc., and shall represent their estimate of the cadet's fitness as an officer as shown by his spirit and military bearing both on and off duty. Account is to be taken of the cadet's alertness, initiative and perserverance. His ability to command a unit in the drill shall be especially noted. In determining the mark in Efficiency, a cadet's record in technical subjects and in theoretical military subjects is to be disregarded.

8. Hereafter failure in Signalling prior to the end of the course shall have no effect on the demotion or discharge of cadets. At the end of the course, a cadet failing in Signalling, but in other respects desirable officer material shall be retained at the School for one week and given intensive work in Signalling. For this purpose no special classes need be formed but the cadet should be required

Schools Booklet.
Mon & Fare Book.

to attend classes already in operation in order to avoid putting an extra burden on the instructors in Signalling. If, at the end of this extra week, the cadet's work is still unsatisfactory, he should be discharged. It is assumed that a cadet has been faithful in his practice. If a cadet shirks his work, he should be demoted or discharged as heretofore.

By direction of the Chief Signal Officer.

Geo. A. Washington.

Captain, Signal Corps
CIO, Schools Branch, Training Section.

A true copy:

(signed) J. M. Van Dyke,
First Lieut. Sig. R. C., A. S.

APPENDIX L4.

Contains the following:

Disease Chart- School of Military Aeronautics
Berkeley, California.
(6 pages)

APPENDIX

Office of the Post Surgeon
SCHOOL OF MILITARY AERONAUTICS,
Berkeley, California.

DISEASE CHART

WEEK	MEN IN SCHOOL	ADMITTED QUARTERS	ADMITTED HOSPITAL	PREVAILING DISEASES WITH NUMBER OF EACH
July 7, 1917 to July 13, 1917	211		1	Measles 1
July 14, 1917 to July 20, 1917	226		1	Measles 1
July 21, 1917 to July 27, 1917	213		2	Measles .... 1 Tonsilitis 1
July 28, 1917 to August 3, 1917	209	10		Pleurisy ... 1 Rubella .... 1 Rhinitis ..... 2 Catarrh .... 4 Mental collapse 1
August 4, 1917 to August 10, 1917	212	2		Diarrhea ... 1
August 11, 1917 to August 17, 1917	192	3		Indigestion 1
August 18, 1917 to August 24, 1917	211			
August 25, 1917 to August 31, 1917	204	13		Rhinitis .... 5 Malaria ... 2 Vaccinia .... 2 Catarrh ... 1
September 1, 1917 to September 7, 1917	215	17		Rhinitis .... 7 Malaise ... 2 Vaccinia 1
September 8, 1917 to September 14, 1917	263	6		Rhinitis ..... 2 Gastritis 1
September 15, 1917 to September 21, 1917	241	4		Indigestion 1
September 22, 1917 to September 28, 1917	263	9		Vaccinia .... 2 Rhinitis .... 1 Indigestion .. 1
September 29, 1917 to October 5, 1917	262	11	2	Rhinitis ... 3 Malaise .... 3 Bronchitis . 1 Indigestion 1

WEEK	MEN IN SCHOOL	ADMITTED QUARTERS	ADMITTED HOSPITAL	PREVAILING DISEASE WITH NUMBER OF EACH
October 6, 1917 to October 12, 1917	291	4		Vaccinia 1
October 13, 1917 to October 19, 1917	265	12		Vaccinia .... 4 Bronchitis .. 1 Pharyngitis 1 Rhinitis ... 1
October 20, 1917 to October 26, 1917	309	12		Rhinitis .... 3 Neurasthenia 1 Malaise ..... 1 Vaccinia 1
October 27, 1917 to November 2, 1917	329 (Deaths -- pneumonia,-- 2)	6		Dermatitis .. 1 Rhinitis ... 1 Vaccinia 1
November 3, 1917, to November 9, 1917	361	7	4	Bronchitis .. 3 Pharyngitis 2 Rhinitis .... 1 Malaise .... 1 Vaccinia 1
November 10, 1917 to November 16, 1917	367 (Deaths -- pneumonia, -- 1)	16	7	Conjunctivitis 9 Tonsilitis... 3 Measles ..... 2 Bronchitis .. 2 Malaise 1
November 17, 1917 to November 23, 1917	394	12	7	Bronchitis ... 6 Malaise ..... 3 Rhinitis ..... 2 Appendicitis 1 Conjunctivitis 1 Neurasthenia 1
November 24, 1917 to November 30, 1917	431	4	4	Bronchitis ... 3 Parotiditis 1 Gastritis 1
December 1, 1917 to December 7, 1917	464	10	4	Bronchitis ... 3 Conjunctivitis 3 Measles ..... 1 Rhinitis 1
December 8, 1917 to December 14, 1917	510	14	5	Conjunctivitis 5 Bronchitis .. 2
December 15, 1917 to December 21, 1917	504	7	3	Bronchitis ... 3 Conjunctivitis .. 2
December 22, 1917 to December 28, 1917	503		2	Bronchitis ... 1 Measles ... 1
December 29, 1917 to January 4, 1918	509		2	Bronchitis .... 1 Dermatitis 1
January 5, 1918 to January 11, 1918	528	9	7	Bronchitis ..... 2 Conjunctivitis 2
January 12, 1918 to January 18, 1918	565	1	6	Bronchitis .... 5 Measles ... 2

WEEK	MEN IN SCHOOL	ADMITTED QUARTERS	ADMITTED HOSPITAL	PREVAILING DISEASES WITH NUMBER OF EACH
January 19, 1918 to January 25, 1918	723	9	16	Pharyngitis 6 Vaccinia 5 Bronchitis 3 Conjunctivitis 3
January 26, 1918 to February 1, 1918	755	15	25	Bronchitis 7 Conjunctivitis 6 Tonsilitis 5 Meales 3 Vaccinia 3 Pharyngitis 2
February 2, 1918 to February 8, 1918	725	15	5	Pharyngitis 4 Conjunctivitis 4 Bronchitis 3
February 9, 1918 to February 15, 1918	701	12	14	Pharyngitis 6 Conjunctivitis 4 Tonsilitis 2
Feb. 16, 1918 to Feb. 22, 1918	644	12	25	Measles 8 Conjunctivitis 6 Pharyngitis 6
Feb. 23, 1918 to March 1, 1918	643	7	13	Pharyngitis 6 Conjunctivitis 2 Measles 2 Tonsillitis 2
March 2, 1918 to March 8, 1918	664	15	15	Conjunctivitis 6 Malaise 2 Pharyngitis 5 Tonsillitis 3
March 9, 1918 to March 15, 1918	657	7	17	Pharyngitis 10 Tonsillitis 4 Conjunctivitis 3 Parotiditis 2 Constipation 2
March 17, 1918 to March 23, 1918	670	14	11	Pharyngitis 8 Conjunctivitis 6 Measles 1 Tonsillitis 1
March 23, 1918 to March 29, 1918	670	19	19	Pharyngitis 19 Conjunctivitis 6 Bronchitis 1 Measles 1
March 30, 1918 to April 5, 1918	642	14	19	Pharyngitis 13 Conjunctivitis 4 Bronchitis 1 Parotiditis 1
April 6, 1918 to April 12, 1918	620	24 Deaths-pneumonia--1	14	Pharyngitis 10 Conjunctivitis 2 Vaccinia 1 Measles 1
April 13, 1918 to April 19, 1918	594	19	23	Parotiditis 11 Pharyngitis 9 Conjunctivitis 3 Tonsillitis 2 Diarrhea 2 Measles 1
April 20, 1918 to April 26, 1918	574	2	14	Parotiditis 5 Pharyngitis 3 Conjunctivitis 2 Bronchitis 1 Meningitis 1 Scarlet fever 1

WEEK	MEN IN SCHOOL	ADMITTED QUARTERS	ADMITTED HOSPITAL	PREVAILING DISEASES WITH NUMBER OF EACH			
April 27, 1918 to May 3, 1918	545	1	3	Parotiditis 2	Pharyngitis 1	Bronchitis 1	Conjunctivitis 1
				Scarlet fever 1	Measles 1		
May 4, 1918 to May 10, 1918	516		13	Parotiditis 7	C-S Meningitis 1	Measles 1	Malaise 1
				Vaccinia 1			
May 11, 1918 to May 17, 1918	564	3	10	Parotiditis 2	Conjunctivitis 2	Gastritis 1	Trismosis 1
				Malaise 1	Vaccinia 1		
May 18, 1918 to May 24, 1918	633	7	24	Conjunctivitis 9	Influenza 6	Malaise 5	Pharyngitis 3
				Whooping cough 1	Parotiditis 1		
May 25, 1918 to May 31, 1918	699		9	Conjunctivitis 2	Dysentery 1	Appendicitis 1	Parotiditis 1
				Malaise 1	Influenza 1		
June 1, 1918 to June 7, 1918	761	2	27	Pharyngitis 5	Conjunctivitis 5	Tonsillitis 2	Malaise 2
				Parotiditis 1	Measles 1		
June 8, 1918 to June 14, 1918	841	1	23	Vaccinia 4	Malaise 3	Tonsillitis 2	Conjunctivitis 2
				Parotiditis 1	Measles 1		
June 15, 1918 to June 21, 1918	874	2	14	Conjunctivitis 3	Parotiditis 2	Tonsillitis 2	Pleurisy 1
				Gastritis 1	Vaccinia 1		
June 22, 1918 to June 28, 1918	844	2	18	Parotiditis 2	Conjunctivitis 2	Malaise 2	Tonsillitis 2
				Measles 1	Influenza 1		
June 29, 1918 to July 5, 1918	878		11	Tonsillitis 2	Chicken-pox 1	Gastritis 1	Sinusitis 1
July 6, 1918 to July 12, 1918	930		20	Parotiditis 5	Conjunctivitis 4	Tonsillitis 3	Pharyngitis 2
				Influenza 1	Appendicitis 1		
July 13, 1918 to July 19, 1918	986	2	5	Pharyngitis 2	Tonsillitis 1	Gastritis 1	
July 20, 1918 to July 26, 1918	1004	[illegible]	19	Conjunctivitis 5	Malaise 4	Pharyngitis 3	Parotiditis 1
				Measles 1	Tonsillitis 1		
July 27, 1918 to August 2, 1918	963	[illegible]	20	Pharyngitis 4	Tonsillitis 2	Conjunctivitis 2	Diarrhoea 2
		(Deaths-(Dracunia) -1		Malaise 2	Parotiditis 1		
August 3, 1918 to August 9, 1918	893	2	11	Pharyngitis 2	Tonsillitis 2	Conjunctivitis 2	C-S mengingitis 1
				Bronchitis 1	Measles 1		
August 10, 1918 to August 16, 1918	856	8	3	Conjunctivitis 2	Pharyngitis 1		

| | | |

WEEK	MEN IN SCHOOL	ADMITTED QUARTERS	ADMITTED HOSPITAL	PREVAILING DISEASES WITH NUMBER OF EACH			
August 17, 1918 to August 23, 1918	845	1	7	Tonsillitis 2 Parotiditis 1 Neurasthenia 1	Pharyngitis 1 Diarrhoea 1		
August 24, 1918 to August 30, 1918	817	1	6	Conjunctivitis 2	Tonsillitis 2		
August 31, 1918 to Sept. 6, 1918	839	1	6	Pharyngitis 2 Conjunctivitis 1 Neurasthenia 1	Rhinitis 2 Dementia 1		
Sept. 7, 1918 to Sept. 13, 1918	867		4	Measles 1 Rhinitis 1	Conjunctivitis 1 Neurasthenia 1		
Sept. 14, 1918 to Sept. 20, 1918	742	1	4	Tonsillitis 2	Sinusitis 1		
Sept. 21, 1918 to Sept. 27, 1918	692	1	6	Tonsillitis 2 Gastritis 1	Pharyngitis 1 Neurasthenia 1		
Sept. 28, 1918 to Oct. 4, 1918	602		7	Influenza 1 Parotiditis 1	Pharyngitis 1		
Oct. 5, 1918 to Oct. 11, 1918	609	2	24	Influenza 17 Rhinitis 2	Pharyngitis 4		
Oct. 12, 1918 to Oct. 18, 1918	581	8	61	Influenza 65	Appendicitis 1		
Oct. 19, 1918 to Oct. 25, 1918	532	5	91	Influenza 92			
Oct. 26, 1918 to November 1, 1918	499		12	Influenza 11			
Nov. 2, 1918 to Nov. 8, 1918	477	1	7	Influenza 5 Appendicitis 1	Bronchitis 1		
Nov. 9, 1918 to Nov. 15, 1918	487	2	5	Corya 3			
Nov. 16, 1918 to Nov. 22, 1918	469		2	Corya 1			
Nov. 23, 1918 to Nov. 29, 1918	448	1	3	Pleurisy 1	Tracheitis 1		

August 17, 1918	868	1	7	Terrible	2	Tigerlike	1
to				Forbidden	1		
August 22, 1918				Overwhelm	1		
to							
August 30, 1918							
, 1918				Continue	1	Descend	1
				Insect	1		
, 1918				Terrible	1	Irresistible	1
				Horrible	1	Overwhelm	1
, 1918							
, 91						Sinuous	1
, 1918	692	1	4				
to							
, 1918							
, 191				Influence	1	Irresistible	1
to				Irresistible	1		
, 1918							
, 1918						Overwhelm	1
, 1918	782	1	10	Interfere	2	Irresistible	1
, 1918							
, 1918							
, 1918							
, 1918							
, 1918							
, 1918							
, 1918				Influence	5	Irresistible	1
, 1918				Irresistible	1		
, 1918							
, 1918							
, 1918				Course	1		
, 1918							
, 191				Tendency	1	Irresistible	1
, 1918							

Week	Men in Hospital	Deaths	Admitted Hospital	Principal Diseases Incidence of Week			
Nov. 30, 1918 to Dec. 6, 1918	234	1		Sinusitis	1		
Dec. 7, 1918 to Dec. 13, 1918	[illegible]		1	Pharyngitis	1		
Dec. 14, 1918 to Dec. 20, 1918	201						
Dec. 21, 1918 to Dec. 27, 1918	192						
Dec. 28, 1918 to Jan. 3, 1919	167						
Jan. 4, 1919 to Jan. 10, 1919	117	4	4	Influenza	4		
Jan. 11, 1919 to Jan. 17, 1919	116		2	Cellulitis	1	Cold	1

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